DOCUMENTS EXPEDITING PROJECT

86th Congress
1st Session

JOINT COMMITTEE PRINT

SELECTED MATERIALS ON ATOMIC ENERGY PATENTS

JOINT COMMITTEE ON ATOMIC ENERGY
CONGRESS OF THE UNITED STATES

VOLUME I

MARCH 1959

Printed for the use of the Joint Committee on Atomic Energy

UNITED STATES
GOVERNMENT PRINTING OFFICE
37771 WASHINGTON : 1959

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LETTER OF TRANSMITTAL

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: Transmitted herewith for the information of the Joint Committee, the Congress, and the public is volume I of Selected Materials on Atomic Energy Patents. Volume II, pertaining to international aspects of atomic energy patents is expected to be ready for distribution in the near future. The Subcommittee on Legislation of the Joint Committee has scheduled public hearings on these subjects, including possible amendments to chapter 13 of the Atomic Energy Act of 1954, from April 21 to 24, 1959.

The Atomic Energy Commission had not yet submitted its formal legislative proposals when this publication "went to press," but a draft bill and analysis were forwarded by AEC for publication with this print, and these are included at pages 15 through 24, together with pertinent background correspondence.

Also included are excerpts from the U.S. Constitution and pertinent statutes, the views of the three members of the AEC Patent Advisory Panel, certain charts, statistics and information obtained from AEC and the Patent Office, statements from the AEC April 15, 1958, meeting on this subject, and excerpts from special articles and reports on atomic energy patents.

It is hoped that these materials, printed in advance of the hearings, will prove helpful to committee members and all other interested persons.

CHET HOLIFIELD,
Chairman, Subcommittee on Legislation.

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SELECTED MATERIALS ON ATOMIC ENERGY PATENTS

CHAPTER I. INTRODUCTION

Before adjournment of the 85th Congress in late August 1958, the chairman and vice chairman of the Joint Committee directed the committee staff to undertake certain studies during the congressional recess. One of these studies pertained to atomic energy patents, and possible amendments of chapter 13 of the Atomic Energy Act with respect to inventions and patents. Accordingly, the committee staff with the assistance of an informal advisory panel, prepared the following outline indicating the areas to be studied.

ATOMIC ENERGY PATENTS

OUTLINE

I. Introduction:
   A. Brief summary of AEC patent policies and procedures.
   B. Comparison with other Federal agencies.
II. Atomic energy patent applications and grants under 1946 and 1954 acts—numbers and scope:
   A. By Commission.
   B. By others.
III. Analysis of special provisions of 1954 act, AEC regulations, and experience:
   A. Compulsory licensing provisions (sec. 153)—expires as to applications filed after September 1, 1959.
   B. Inventions conceived under Commission contract "or other relationship" (sec. 152).
   C. Inventions in atomic weapons field (sec. 151).
   D. Award system (sec. 157).
   E. Reporting requirements and procedures in Patent Office (secs. 151, 152, and 153).
   F. Antitrust and encouragement of competition (secs. 153, 158).
   G. Others.
IV. Special problems:
   A. Activities of former AEC employees and contractors.
   B. Others.
V. International patent problems:
   A. Comparison with atomic energy patent provisions of other countries.
   B. Problems of patent protection abroad.

Chapter I of this print is intended to serve as a brief introduction of the materials which follow.

Chapter II includes excerpts from the U.S. Constitution and statutes. The constitutional clause in article I, section 8 provides that Congress shall have power "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." Excerpts have also been included in Chapter II from the Atomic Energy Act and from the general patent laws contained in title 35 of the United States Code.

Chapter III then sets forth certain correspondence between the Joint Committee and the AEC, and a draft bill and section by section analysis as prepared by AEC. The AEC letter of March 16, 1959, signed by Acting Chairman Libby, which forwarded this bill, stated that the Commission had not yet received complete views and advice from other Federal agencies, and that it might, therefore, submit certain modifications to the proposed bill prior to the patent hearings. In this proposed bill the Commission has recommended amendments to sections 151, 152, 153, 155 and 157 of the act, and deletion of present section 158. Section 5 of the AEC draft bill recommends that subsection h of section 153, the so-called "compulsory licensing" section, be amended by extending the expiration date another 5 years, from September 1, 1959, to September 1, 1964.

Chapter IV of the print reprints in full the views of the members of the AEC Patent Advisory Panel, as forwarded to the Joint Committee by AEC letter dated March 4, 1959. Also included is a chart, as prepared by AEC, indicating in outline form the views of each of the three members of the Patent Advisory Panel (Mr. Ooms, Mr. Dienner, and Mr. Brown) as to each subsection of each present section of the act. In addition, there have been reprinted certain brief excerpts from the 1947 report of the Patent Advisory Panel.

Chapter V of this print includes certain charts, statistics and information on atomic energy patents, as furnished by the Patent Office and AEC. The Patent Office charts indicate trends in filing patent applications from 1946 to present. The AEC has provided certain information in response to questions from the Joint Committee and also from the Senate Subcommittee on Patents, Trademarks, and Copyrights. Also included in chapter V are miscellaneous correspondence between the Joint Committee, the Patent Office and the AEC concerning access to applications and other matters.

Chapter VI of this print includes excerpts from the meeting held at AEC headquarters on April 15, 1958, on AEC patent practices and policies. Representative statements from industry spokesmen, from the American Patent Law Association, and other groups, have been reprinted.

Chapter VII of this print includes excerpts from reports on patent policies of other Federal agencies, including the 1947 Report and Recommendations of the Attorney General to the President on Government Patent Practices and Policies. Brief quotations have also been reprinted from the recent (March 9, 1959) report of the Senate Subcommittee on Patents, Trademarks, and Copyrights, which indicates that of 18 different Government agencies, preliminary studies conducted by the subcommittee revealed no uniformity of policy followed by these agencies in regard to their patent policies. The subcommittee report states further that it is continuing its

investigations, and that reports will be issued of each agency in turn and then an overall final report discussing the problems and outlining the additional facts needed for informed legislative judgment.

In preparing for these hearings, the staff of the Joint Committee has worked closely with and has received valuable assistance and cooperation from the staff of the Senate Subcommittee of the Judiciary on Patents, Trademarks, and Copyrights.

Chapter VIII of this print includes three law review articles on atomic energy patents by recognized legal authorities.

Chapter IX includes a bibliography of atomic energy patent materials, as prepared by the Library of Congress.

The committee staff is continuing to obtain additional information concerning atomic energy patents, and has requested further reports from AEC, particularly as to how it protects the Government's interests with contractors who also have extensive private atomic activities, and as to procedures for review of patent applications by former employees. Such additional information and statistics will be incorporated into the record of the hearings.

In preparing for the hearings, the Joint Committee staff has received valuable assistance from two consultants, Mr. William K. Chipman of the University of Wisconsin Law School, and Mr. Bernard Wohlfert of the Department of Justice.

The committee has also obtained certain studies and reports pertaining to atomic energy patents in the foreign field which were not completed at the time of publication of this print, but which will be published and distributed as an addendum in the near future, and prior to the hearings, scheduled for April 21–24, 1959.

CHAPTER II. EXCERPTS FROM U.S. CONSTITUTION AND STATUTES

The Constitutional Provision

Art. 1, sec. 8. The Congress shall have power * * * To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.

* * * * * * *

The Atomic Energy Act of 1954

Section 1. Declaration.—Atomic energy is capable of application for peaceful as well as military purposes. It is therefore declared to be the policy of the United States that—

a. the development, use, and control of atomic energy shall be directed so as to make the maximum contribution to the general welfare, subject at all times to the paramount objective of making the maximum contribution to the common defense and security; and

* * * * * * *

Sec. 3. Purpose.—It is the purpose of this Act to effectuate the policies set forth above by providing for—

a. a program of conducting, assisting, and fostering research and development in order to encourage maximum scientific and industrial progress;

b. a program for the dissemination of unclassified scientific and technical information and for the control, dissemination, and declassification of Restricted Data, subject to appropriate safeguards, so as to encourage scientific and industrial progress;

c. a program for Government control of the possession, use, and production of atomic energy and special nuclear material so directed as to make the maximum contribution to the common defense and security and the national welfare;

d. a program to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public;

e. a program of international cooperation to promote the common defense and security and to make available to cooperating nations the benefits of peaceful applications of atomic energy as widely as expanding technology and considerations of the common defense and security will permit; and

f. a program of administration which will be consistent with the foregoing policies and programs, with international arrangements, and with agreements for cooperation, which will enable

the Congress to be currently informed so as to take further legislative action as may be appropriate.

* * * * * * *

CHAPTER 12. CONTROL OF INFORMATION

SEC. 141. POLICY.—It shall be the policy of the Commission to control the dissemination and declassification of Restricted Data in such a manner as to assure the common defense and security. Consistent with such policy, the Commission shall be guided by the following principles:

a. Until effective and enforceable international safeguards against the use of atomic energy for destructive purposes have been established by an international arrangement, there shall be no exchange of Restricted Data with other nations except as authorized by section 144; and

b. The dissemination of scientific and technical information relating to atomic energy should be permitted and encouraged so as to provide that free interchange of ideas and criticism which is essential to scientific and industrial progress and public understanding and to enlarge the fund of technical information.

SEC. 142. CLASSIFICATION AND DECLASSIFICATION OF RESTRICTED DATA.—

a. The Commission shall from time to time determine the data, within the definition of Restricted Data, which can be published without undue risk to the common defense and security and shall thereupon cause such data to be declassified and removed from the category of Restricted Data.

b. The Commission shall maintain a continuous review of Restricted Data and of any Classification Guides issued for the guidance of those in the atomic energy program with respect to the areas of Restricted Data which have been declassified in order to determine which information may be declassified and removed from the category of Restricted Data without undue risk to the common defense and security.

* * * * * * *

CHAPTER 13. PATENTS AND INVENTIONS

SEC. 151. MILITARY UTILIZATION.—

a. No patent shall hereafter be granted for any invention or discovery which is useful solely in the utilization of special nuclear material or atomic energy in an atomic weapon. Any patent granted for any such invention or discovery is hereby revoked, and just compensation shall be made therefor.

b. No patent hereafter granted shall confer any rights with respect to any invention or discovery to the extent that such invention or discovery is used in the utilization of special nuclear material or atomic energy in atomic weapons. Any rights conferred by any patent heretofore granted for any invention or discovery are hereby revoked to the extent that such invention or discovery is so used, and just compensation shall be made therefor.

c. Any person who has made or hereafter makes any invention or discovery useful (1) in the production or utilization of special nuclear material or atomic energy; (2) in the utilization of special nuclear material in an atomic weapon; or (3) in the utilization of atomic energy

in an atomic weapon, shall file with the Commission a report containing a complete description thereof unless such invention or discovery is described in an application for a patent filed with the Commissioner of Patents by such person within the time required for the filing of such report. The report covering any such invention or discovery shall be filed on or before whichever of the following is the later; either the ninetieth day after completion of such invention or discovery; or the ninetieth day after such person first discovers or first has reason to believe that such invention or discovery is useful in such production or utilization.

d. The Commissioner of Patents shall notify the Commission of all applications for patents heretofore or hereafter filed which, in his opinion, disclose inventions or discoveries required to be reported under subsection 151 c., and shall provide the Commission access to all such applications.

SEC. 152. INVENTIONS CONCEIVED DURING COMMISSION CONTRACTS.—Any invention or discovery, useful in the production or utilization of special nuclear material or atomic energy, made or conceived under any contract, subcontract, arrangement, or other relationship with the Commission, regardless of whether the contract or arrangement involved the expenditure of funds by the Commission, shall be deemed to have been made or conceived by the Commission, except that the Commission may waive its claim to any such invention or discovery if made or conceived by any person at or in connection with any laboratory under the jurisdiction of the Commission as provided in section 33, or under such other circumstances as the Commission may deem appropriate. No patent for any invention or discovery, useful in the production or utilization of special nuclear material or atomic energy, shall be issued unless the applicant files with the application, or within 30 days after request therefor by the Commissioner of Patents, a statement under oath setting forth the full facts surrounding the making or conception of the invention or discovery described in the application and whether the invention or discovery was made or conceived in the course of, in connection with, or under the terms of any contract, subcontract, arrangement, or other relationship with the Commission, regardless of whether the contract or arrangement involved the expenditure of funds by the Commission. The Commissioner of Patents shall forthwith forward copies of the application and the statement to the Commission.

The Commissioner of Patents may proceed with the application and issue the patent to the applicant (if the invention or discovery is otherwise patentable) unless the Commission, within 90 days after receipt of copies of the application and statement, directs the Commissioner of Patents to issue the patent to the Commission (if the invention or discovery is otherwise patentable) to be held by the Commission as the agent of and on behalf of the United States.

If the Commission files such a direction with the Commissioner of Patents, and if the applicant's statement claims, and the applicant still believes, that the invention or discovery was not made or conceived in the course of, in connection with, or under the terms of any contract, subcontract, arrangement, or other relationship with the Commission entitling the Commission to take title to the application or the patent the applicant may, within 30 days after notification of the filing of such a direction, request a hearing before a Board of Patent

Interferences. The Board shall have the power to hear and determine whether the Commission was entitled to the direction filed with the Commissioner of Patents. The Board shall follow the rules and procedures established for interference cases and an appeal may be taken by either the applicant or the Commission from the final order of the Board to the Court of Customs and Patent Appeals in accordance with the procedures governing the appeals from the Board of Patent Interferences.

If the statement filed by the applicant should thereafter be found to contain false material statements any notification by the Commission that it has no objections to the issuance of a patent to the applicant shall not be deemed in any respect to constitute a waiver of the provisions of this section or of any applicable civil or criminal statute, and the Commission may have the title to the patent transferred to the Commission on the records of the Commissioner of Patents in accordance with the provisions of this section.

SEC. 153. NONMILITARY UTILIZATION.—

a. The Commission may, after giving the patent owner an opportunity for a hearing, declare any patent to be affected with the public interest if (1) the invention or discovery covered by the patent is of primary importance in the production or utilization of special nuclear material or atomic energy; and (2) the licensing of such invention or discovery under this section is of primary importance to effectuate the policies and purposes of this Act.

b. Whenever any patent has been declared affected with the public interest, pursuant to subsection 153a.—

(1) the Commission is hereby licensed to use the invention or discovery covered by such patent in performing any of its powers under this Act; and

(2) any person may apply to the Commission for a nonexclusive patent license to use the invention or discovery covered by such patent, and the Commission shall grant such patent license to the extent that it finds that the use of the invention or discovery is of primary importance to the conduct of an activity by such person authorized under this Act.

c. Any person—

(1) who has made application to the Commission for a license under sections 53, 62, 63, 81, 103, or 104, or a permit or lease under section 67;

(2) to whom such license, permit, or lease has been issued by the Commission;

(3) who is authorized to conduct such activities as such applicant is conducting or proposes to conduct under a general license issued by the Commission under sections 62 or 81; or

(4) whose activities or proposed activities are authorized under section 31,

may at any time make application to the Commission for a patent license for the use of an invention or discovery useful in the production or utilization of special nuclear material or atomic energy covered by a patent. Each such application shall set forth the nature and purpose of the use which the applicant intends to make of the patent license, the steps taken by the applicant to obtain a patent license from the owner of the patent, and a statement of the effects, as estimated by

the applicant, on the authorized activities which will result from failure to obtain such patent license and which will result from the granting of such patent license.

d. Whenever any person has made an application to the Commission for a patent license pursuant to subsection 153c.—

(1) the Commission, within 30 days after the filing of such application, shall make available to the owner of the patent all of the information contained in such application, and shall notify the owner of the patent of the time and place at which a hearing will be held by the Commission;

(2) the Commission shall hold a hearing within 60 days after the filing of such application at a time and place designated by the Commission; and

(3) in the event an applicant applies for two or more patent licenses, the Commission may, in its discretion, order the consolidation of such applications, and if the patents are owned by more than one owner, such owners may be made parties to one hearing.

e. If, after any hearing conducted pursuant to subsection 153d., the Commission finds that—

(1) the invention or discovery covered by the patent is of primary importance in the production or utilization of special nuclear material or atomic energy;

(2) the licensing of such invention or discovery is of primary importance to the conduct of the activities of the applicant;

(3) the activities to which the patent license are proposed to be applied by such applicant are of primary importance to the furtherance of policies and purposes of this Act; and

(4) such applicant cannot otherwise obtain a patent licnese from the owner of the patent on terms which the Commission deems to be reasonable for the intended use of the patent to be made by such applicant,

the Commission shall license the applicant to use the invention or discovery covered by the patent for the purposes stated in such application on terms deemed equitable by the Commission and generally not less fair than those granted by the patentee or by the Commission to similar licensees for comparable use.

f. The Commission shall not grant any patent license pursuant to subsection 153e. for any other purpose than that stated in the application. Nor shall the Commission grant any patent license to any other applicant for a patent license on the same patent without an application being made by such applicant pursuant to subsection 153c., and without separate notification and hearing as provided in subsection 153d., and without a separate finding as provided in subsection 153e.

g. The owner of the patent affected by a declaration or a finding made by the Commission pursuant to subsection 153b. or 153e. shall be entitled to a reasonable royalty fee from the licensee for any use of an invention or discovery licensed by this section. Such royalty fee may be agreed upon by such owner and the patent licensee, or in the absence of such agreement shall be determined for each patent license by the Commission pursuant to subsection 157c.

h. The provisions of this section shall apply to any patent the application for which shall have been filed before September 1, 1959.

SEC. 154. INJUNCTIONS.—No court shall have jurisdiction or power to stay, restrain, or otherwise enjoin the use of any invention or discovery by a patent licensee, to the extent that such use is licensed by subsection 153b. or 153e. If, in any action against such patent licensee, the court shall determine that the defendant is exercising such license, the measure of damages shall be the royalty fee determined pursuant to subsection 157c., together with such costs, interest, and reasonable attorney's fees as may be fixed by the court. If no royalty fee has been determined, the court shall stay the proceeding until the royalty fee is determined pursuant to subsection 157c. If any such patent licensee shall fail to pay such royalty fee, the patentee may bring an action in any court of competent jurisdiction for such royalty fee, together with such costs, interest, and reasonable attorney's fees as may be fixed by the court.

SEC. 155. PRIOR ART.—In connection with applications for patents covered by this Chapter, the fact that the invention or discovery was known or used before shall be a bar to the patenting of such invention or discovery even though such prior knowledge or use was under secrecy within the atomic energy program of the United States.

SEC. 156. COMMISSION PATENT LICENSES.—The Commission shall establish standard specifications upon which it may grant a patent license to use any patent held by the Commission or declared to be affected with the public interest pursuant to subsection 153a. Such a patent license shall not waive any of the other provisions of this Act.

SEC. 157. COMPENSATION, AWARDS, AND ROYALTIES.—

a. PATENT COMPENSATION BOARD.—The Commission shall designate a Patent Compensation Board to consider applications under this section. The members of the Board shall receive a per diem compensation for each day spent in meetings or conferences, and all members shall receive their necessary traveling or other expenses while engaged in the work of the Board. The members of the Board may serve as such without regard to the provisions of sections 281, 283, or 284 of Title 18 of the United States Code, except in so far as such sections may prohibit any such member from receiving compensation in respect of any particular matter which directly involves the Commission or in which the Commission is directly interested.

b. ELIGIBILITY.—

(1) Any owner of a patent licensed under section 158 or subsections 153b. or 153e., or any patent licensee thereunder may make application to the Commission for the determination of a reasonable royalty fee in accordance with such procedures as the Commission by regulation may establish.

(2) Any person seeking to obtain the just compensation provided in section 151 shall make application therefor to the Commission in accordance with such procedures as the Commission may by regulation establish.

(3) Any person making any invention or discovery useful in the production or utilization of special nuclear material or atomic energy, who is not entitled to compensation or a royalty therefor under this Act, and who has complied with the provisions of section 151c. hereof

may make application to the Commission for, and the Commission may grant, an award. The Commission may also, upon the recommendation of the General Advisory Committee, and with the approval of the President, grant an award for any especially meritorious contribution to the development, use, or control of atomic energy.

c. STANDARDS.—

(1) In determining a reasonable royalty fee as provided for in subsections 153b., or 153e., the Commission shall take into consideration (A) the advice of the Patent Compensation Board; (B) any defense, general or special, that might be pleaded by a defendant in an action for infringement; (C) the extent to which, if any, such patent was developed through federally financed research; and (D) the degree of utility, novelty, and importance of the invention or discovery, and may consider the cost to the owner of the patent of developing such invention or discovery or acquiring such patent.

(2) In determining what constitutes just compensation as provided for in section 151, or in determining the amount of any award under subsection 157b.(3), the Commission shall take into account the considerations set forth in subsection 157c.(1) and the actual use of such invention or discovery. Such compensation may be paid by the Commission in periodic payments or in a lump sum.

SEC. 158. MONOPOLISTIC USE OF PATENTS.—Whenever the owner of any patent hereafter granted for any invention or discovery of primary use in the utilization or production of special nuclear material or atomic energy is found by a court of competent jurisdiction to have intentionally used such patent in a manner so as to violate any of the antitrust laws specified in subsection 105a., there may be included in the judgment of the court, in its discretion and in addition to any other lawful sanctions, a requirement that such owner license such patent to any other licensee of the Commission who demonstrates a need therefor. Such licensee shall pay a reasonable royalty fee, to be determined in accordance with section 157, to the owner of the patent.

SEC. 159. FEDERALLY FINANCED RESEARCH.—Nothing in this Act shall affect the right of the Commission to require that patents granted on inventions made or conceived during the course of federally financed research or operations, be assigned to the United States.

SEC. 160. SAVING CLAUSE.—Any patent application on which a patent was denied by the United States Patent Office under sections 11(a)(1), 11(a)(2), or 11(b) of the Atomic Energy Act of 1946, and which is not prohibited by section 151 or section 155 of this Act may be reinstated upon application to the Commissioner of Patents within one year after enactment of this Act and shall then be deemed to have been continuously pending since its original filing date: *Provided, however*, That no patent issued upon any patent application so reinstated shall in any way furnish a basis of claim against the Government of the United States.

* * * * * * *

TITLE 35, UNITED STATES CODE

§ 1. Establishment

The Patent Office shall continue as an office in the Department of Commerce, where records, books, drawings, specifications, and other papers and things pertaining to patents and to trade-mark registrations shall be kept and preserved, except as otherwise provided by law (R.S. 475; 35 U.S.C., 1946 ed., 1).

* * * * * * *

§ 14. Annual report to Congress

The Commissioner shall report to Congress annually the moneys received and expended, statistics concerning the work of the Office, and other information relating to the Office as may be useful to the Congress or the public (R.S. 494; 35 U.S.C., 1946 ed., 20).

* * * * * * *

§ 102. Conditions for patentability; novelty and loss of right to patent

A person shall be entitled to a patent unless—

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or

(c) he has abandoned the invention, or

(d) the invention was first patented or caused to be patented by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application filed more than twelve months before the filing of the application in the United States, or

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or

(f) he did not himself invent the subject matter sought to be patented, or

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other (R. S. 4886, 4887, 4923; 35 U. S. C., 1946 ed., 31, 32, 72).

* * * * * * *

§ 111. Application for patent

Application for patent shall be made by the inventor, except as otherwise provided in this title, in writing to the Commissioner. Such application shall include: (1) a specification as prescribed by section 112 of this title; (2) a drawing as prescribed by section 113 of this title; and (3) an oath by the applicant as prescribed by section 115 of this title. The application must be signed by the applicant

and accompanied by the fee required by law (R.S. 4888; 35 U.S.C., 1946 ed., 33).

* * * * * * *

§ 122. Confidential status of applications

Applications for patents shall be kept in confidence by the Patent Office and no information concerning the same given without authority of the applicant or owner unless necessary to carry out the provisions of any Act of Congress or in such special circumstances as may be determined by the Commissioner.

* * * * * * *

§ 188. Rules and regulations, delegation of power

The Atomic Energy Commission, the Secretary of a defense department, the chief officer of any other department or agency of the Government designated by the President as a defense agency of the United States, and the Secretary of Commerce, may separately issue rules and regulations to enable the respective department or agency to carry out the provisions of this chapter, and may delegate any power conferred by this chapter (Act Feb. 1, 1952, ch. 4, sec. 8, 66 Stat. 6; 35 U.S.C., 1946 ed., 158).

* * * * * * *

and accompanied by the fee required by law (35 U.S.C., 1946 ed., 33).

* * * * * * *

§ 122. Confidential status of applications.

Applications for patents shall be kept in confidence by the Patent Office and no information concerning the same given without authority of the applicant or owner unless necessary to carry out the provisions of any Act of Congress or in such special circumstances as may be determined by the Commissioner.

* * * * * * *

§ 188. Rules and regulations, delegation of power.

The Atomic Energy Commission, the Secretary of a defense department, the chief officer of any other department or agency of the Government designated by the President as a defense agency of the United States, and the Secretary of Commerce, may separately issue rules and regulations to enable the respective department or agency to carry out the provisions of this chapter, and may delegate any power conferred by this chapter (Act Feb. 1, 1940, ch. 18, sec. 6, 54 Stat. 6; 35 U.S.C., 1946 ed., 95).

CHAPTER III. A.E.C. DRAFT BILL

Background Correspondence

Congress of the United States,
Joint Committee on Atomic Energy,
December 2, 1958.

Mr. Alvin R. Luedecke,
General Manager, U.S. Atomic Energy Commission,
Washington, D.C.

Dear Mr. Luedecke: The Joint Committee on Atomic Energy has tentatively scheduled hearings on the subject of atomic energy patent policies and procedures, and the operation of chapter 13 of the Atomic Energy Act of 1954 pertaining to patents and inventions, in April or May of 1959.

It is requested that the Commission submit its legislative recommendations, or proposed bills, concerning this subject to the Joint Committee on or before March 1, 1959.

Sincerely yours,

James T. Ramey,
Executive Director.

U.S. Atomic Energy Commission,
Washington, D.C., February 27, 1959.

Mr. James T. Ramey,
Executive Director, Joint Committee on Atomic Energy,
Congress of the United States.

Dear Mr. Ramey: In your letter of December 2, 1958, advising of tentative hearings on patent policies and procedures and the operation of chapter 13 of the Atomic Energy Act of 1954 for April of 1959, you suggested that the Commission submit its legislative recommendations or proposals to the Joint Committee on or before March 1, 1959.

While the staff has presented certain recommendations to the Commission, the Commission has not been able to consider fully the patent proposals due to the extensive consideration given to the power program over the past several weeks.

It is estimated that the Commission will submit its legislative patent recommendations to the Joint Committee as promptly as the Commission and the Bureau of the Budget have taken action thereon.

Very truly yours,

A. R. Luedecke, *General Manager.*

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
March 4, 1959.

Mr. JOHN A. MCCONE,
Chairman, U.S. Atomic Energy Commission,
Washington, D.C.

DEAR MR. MCCONE: By letter dated December 2, 1958, to Mr. Luedecke, Mr. Ramey requested that the Commission submit its legislative recommendations on the subject of atomic energy patents to the Joint Committee on or before March 1, 1959. Although this was 3 months' advance notice, Mr. Luedecke replied by letter dated February 27, 1959, that such recommendations would not be ready on March 1, 1959, but would be forwarded at some indefinite date in the future.

The Joint Committee had been planning to distribute a committee print containing background information on patents about March 20, 1959, to persons planning to participate in the hearings, including the members of the committee and the Congress. It was planned to include in this print information concerning the Commission's current patent legislative recommendations.

It is requested therefore that the Commission forward its legislative patent recommendations as soon as possible, but in no event later than March 16, 1959.

Sincerely yours,

CHET HOLIFIELD,
Chairman, Subcommittee on Legislation.
CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy.

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., March 16, 1959.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR SENATOR ANDERSON: I have your letter of March 4, 1959, in which you advise that the Joint Committee is planning to distribute a committee print containing background information on patents on or about March 20, 1959, and that you are planning to include in this print information concerning the Commission's current patent recommendations. For this reason, you have asked for our recommendations by no later than March 16, 1959.

In order to make it possible for the Commission's proposed recommendations to be incorporated in the study of the joint committee, the attached draft bill and section-by-section analysis are being forwarded to you before the Commission acts upon the views and advice which it may receive from other Federal agencies. Accordingly, we may submit certain modifications to the proposed bill prior to the patent hearings which, we understand, are presently scheduled for April 21 through April 24, inclusive.

Sincerely yours,

W. F. LIBBY, *Acting Chairman.*

Enclosures: Proposed bill; comparative bill; analysis.

AEC Proposed Bill

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 151 of the Atomic Energy Act of 1954, as amended, is amended by deleting in the descriptive title the words "Military Utilization", and inserting in lieu thereof "Inventions Relating to Atomic Weapons, and Filing of Reports."

Sec. 2. That subsection c. of 151 of the Atomic Energy Act of 1954, as amended, is amended to read as follows:

"c. Any person who has made or hereafter makes any invention or discovery useful in the production or utilization of special nuclear material or atomic energy, shall file with the Commission a report containing a complete description thereof unless such invention or discovery is described in an application for a patent filed with the Commissioner of Patents by such person within the time required for the filing of such report. The report covering any such invention or discovery shall be filed on or before the one hundred and eightieth day after such person first discovers or first has reason to believe that such invention or discovery is useful in such production or utilization."

Sec. 3. That section 151 of the Atomic Energy Act of 1954, as amended, is amended by adding at the end thereof the following new subsection:

"e. Reports filed pursuant to subsection c. of this section, and applications to which access is provided under subsection d. of this section, shall be kept in confidence by the Commission, and no information concerning the same given without authority of the inventor or owner unless necessary to carry out the provisions of any Act of Congress or in such special circumstances as may be determined by the Commission."

Sec. 4. That section 152 of the Atomic Energy Act of 1954, as amended, is amended to read as follows:

"Sec. 152. Inventions Conceived During Commission Contracts. Any invention or discovery, useful in the production or utilization of special nuclear material or atomic energy, made or conceived in the course of or under any contract, subcontract or arrangement entered into with or for the benefit of the Commission, regardless of whether the contract, subcontract or arrangement involved the expenditure of funds by the Commission, shall be vested in, and be the property of, the Commission, except that the Commission may waive its claim to any such invention or discovery under such circumstances as the Commission may deem appropriate. No patent for any invention or discovery, useful in the production or utilization of special nuclear material or atomic energy, shall be issued unless the applicant files with the application, or within 30 days after request therefor by the Commissioner of Patents (unless the Commission advises the Commissioner of Patents that its rights have been determined and, therefore no statement is necessary) a statement under oath setting forth the full facts surrounding the making or conception of the invention or discovery described in the application and whether the invention or discovery was made or conceived in the course of or under any contract, subcontract, or arrangement entered into with or for the benefit of the Commission, regardless of whether

the contract, subcontract, or arrangement involved the expenditure of funds by the Commission. The Commissioner of Patents shall as soon as the application is otherwise in condition for allowance forward copies of the application and the statement to the Commission.

"The Commissioner of Patents may proceed with the application and issue the patent to the applicant (if the invention or discovery is otherwise patentable) unless the Commission, within 90 days after receipt of copies of the application and statement, directs the Commissioner of Patents to issue the patent to the Commission (if the invention or discovery is otherwise patentable) to be held by the Commission as the agent of an on behalf of the United States.

"If the Commission files such a direction with the Commissioner of Patents, and if the applicant's statement claims, and the applicant still believes, that the invention or discovery was not made or conceived in the course of or under any contract, subcontract or arrangement entered into with or for the benefit of the Commission entitling the Commission to the title to the application or the patent the applicant may, within 30 days after notification of the filing of such a direction, file a civil action against the Commission in the United States District Court for the District of Columbia. Such Court shall have power to hear and determine whether the Commission was entitled to the direction filed with the Commissioner of Patents, and shall direct the Commissioner of Patents accordingly.

"If the statement filed by the applicant should thereafter be found to contain false material statements any notification by the Commission that it has no objection to the issuance of a patent to the applicant shall not be deemed in any respect to constitute a waiver of the provisions of this section or of any applicable civil or criminal statute, and the Commission may have the title to the patent transferred to the Commission on the records of the Commissioner of Patents in accordance with the provisions of this section. A determination of rights by the Commission pursuant to a contractual provision prior to the request of the Commissioner of Patents for the statement, shall be final in the absence of false material statements or nondisclosure of material facts by the applicant."

SEC. 5. That subsection h. of section 153 of the Atomic Energy Act of 1954, as amended, is amended by deleting the figure "1959" and inserting in lieu thereof "1964".

SEC. 6. That section 155 of the Atomic Energy Act of 1954, as amended, is amended to read as follows:

"SEC. 155. PRIOR ART.—In connection with applications for patents and patents for an invention or discovery covered by this Chapter, the fact that the invention or discovery was known or used before the time applicant made the invention or discovery shall be a bar to the patenting of, or shall invalidate a patent covering such invention or discovery even though such prior knowledge or use was under secrecy within the atomic energy program of the United States."

SEC. 7. That section 157 of the Atomic Energy Act of 1954, as amended, is amended by adding at the end thereof the following new subsection:

> "d. *Period of Limitations.*—Every application under this section shall be barred unless filed within six years after the date on which first accrues the right to such reasonable royalty fee, just compensation, or award for which such application is filed."

SEC. 8. That section 158 of the Atomic Energy Act of 1954, as amended, is deleted, and sections 159 and 160 are renumbered accordingly.

Dated March 13, 1959.

COMPARATIVE BILL (PREPARED BY AEC)

"SEC. 151 [MILITARY UTILIZATION] INVENTIONS RELATING TO ATOMIC WEAPONS, AND FILING OF REPORTS.—

"a. No patent shall hereafter be granted for any invention or discovery which is useful solely in the utilization of special nuclear material or atomic energy in an atomic weapon. Any patent granted for any such invention or discovery is hereby revoked, and just compensation shall be made therefor.

"b. No patent hereafter granted shall confer any rights with respect to any invention or discovery to the extent that such invention or discovery is used in the utilization of special nuclear material or atomic energy in atomic weapons. Any rights conferred by any patent heretofore granted for any invention or discovery are hereby revoked to the extent that such invention or discovery is so used, and just compensation shall be made therefor.

"c. Any person who has made or hereafter makes any invention or discovery useful [(1)] in the production or utilization of special nuclear material or atomic energy [;], [(2) in the utilization of special nuclear material in an atomic weapon; or (3) in the utilization of atomic energy in an atomic weapon,] shall file with the Commission a report containing a complete description thereof unless such invention or discovery is described in an application for a patent filed with the Commissioner of Patents by such persons within the time required for the filing of such report. The report covering any such invention or discovery shall be filed on or before [whichever of the following is the later; either the ninetieth day after completion of such invention or discovery; or the ninetieth day] *the one hundred and eightieth day* after such person first discovers or first has reason to believe that such invention or discovery is useful in such production or utilization.

"d. The Commissioner of Patents shall notify the Commission of all applications for patents heretofore or hereafter filed which, in his opinion, disclose inventions or discoveries required to be reported under subsection 151c., and shall provide the Commission access to all such applications.

"*e. Reports filed pursuant to subsection c. of this section, and applications to which access is provided under subsection d. of this section, shall be kept in confidence by the Commission, and no information concerning the same given without authority of the inventor or owner unless necessary to carry out the provisions of any Act of Congress or in such special circumstances as may be determined by the Commission.*"

"SEC. 152. INVENTIONS CONCEIVED DURING COMMISSION CONTRACTS.—Any invention or discovery, useful in the production or utilization of special nuclear material or atomic energy, made or conceived *in the course of or* under any contract, subcontract *or* arrangement, [or other relationship with the Commission] *entered into with or for the benefit of the Commission* regardless of whether the contract, *subcontract*, or arrangement, involved the expenditure of funds by the

Commission, shall be [deemed to have been made or conceived by the Commission], *vested in and be the property of the Commission,* except that the Commission may waive its claim to any such invention or discovery [if made or conceived by any person at or in connection with any laboratory under the jurisdiction of the Commission as provided in section 33, or] under such [other] circumstances as the Commission may deem appropriate. No patent for any invention or discovery, useful in the production or utilization of special nuclear material or atomic energy, shall be issued unless the applicant files with the application, or within 30 days after request therefor by the Commissioner of Patents, (*unless the Commission advises the Commissioner of Patents that its rights have been determined and, therefore no statement is necessary*) a statement under oath setting forth the full facts surrounding the making or conception of the invention or discovery described in the application and whether the invention or discovery was made or conceived in the course of, [in connection with, or under the terms of any contract, subcontract, arrangement, or other relationship with the Commission,] *or under any contract, subcontract or arrangement entered into with or for the benefit of the Commission* regardless of whether the contract, *subcontract,* or arrangement involved the expenditure of funds by the Commission. The Commissioner of Patents shall [forthwith] *as soon as the application is otherwise in condition for allowance* forward copies of the application and the statement to the Commission.

"The Commissioner of Patents may proceed with the application and issue the patent to the applicant (if the invention or discovery is otherwise patentable) unless the Commission, within 90 days after receipt of copies of the application and statement, directs the Commissioner of Patents to issue the patent to the Commission (if the invention or discovery is otherwise patentable) to be held by the Commission as the agent of and on behalf of the United States.

"If the Commission files such a direction with the Commissioner of Patents, and if the applicant's statement claims, and the applicant still believes, that the invention or discovery was not made or conceived in the course of [in connection with,] or under [the terms of] any contract, subcontract *or* arrangement, [or other relationship with the Commission] *entered into with or for the benefit of the Commission* entitling the Commission to [take] *the* title to the application or the patent the applicant may, within 30 days after notification of the filing of such a direction, [request a hearing before a Board of Patent Interferences] *file a civil action against the Commission in the U.S. District Court for the District of Columbia.* [The Board] *Such Court* shall have the power to hear and determine whether the Commission was entitled to the direction filed with the Commissioner of Patents *and shall direct the Commissioner of Patents accordingly.* [The Board shall follow the rules and procedures established for interference cases and an appeal may be taken by either the applicant or the Commission from the final order of the Board to the Court of Customs and Patent Appeals in accordance with the procedures governing the appeals from the Board of Patent Interferences.]

"If the statement filed by the applicant should thereafter be found to contain false material statements any notification by the Commission that it has no objections to the issuance of a patent to the applicant shall not be deemed in any respect to constitute a waiver

of the provisions of this section or of any applicable civil or criminal statute, and the Commission may have the title to the patent transferred to the Commission on the records of the Commissioner of Patents in accordance with the provisions of this section. *A determination of rights by the Commission pursuant to a contractual provision prior to the request of the Commission of Patents for the statement, shall be final in the absence of false material statements or nondisclosure of material facts by the applicant.*

"SEC. 153. NONMILITARY UTILIZATION.—

"h. The provisions of this section shall apply to any patent the application for which shall have been filed before September 1, [1959] *1964*.

"SEC. 155. PRIOR ART.—In connection with applications for patents *and patents for an invention or discovery* covered by this Chapter, the fact that the invention or discovery was known or used before *the time applicant made the invention or discovery* shall be a bar to the patenting of *or shall invalidate a patent covering* such invention or discovery even though such prior knowledge or use was under secrecy within the atomic energy program of the United States.

"SEC. 157. COMPENSATION, AWARDS, AND ROYALTIES.—

"d. Period of Limitations—Every application under this section shall be barred unless filed within six years after the date on which first accrues the right to such reasonable royalty fee, just compensation, or award for which such application is filed.

"[SEC. 158. MONOPOLISTIC USE OF PATENTS.—Whenever the owner of any patent hereafter granted for any invention or discovery of primary use in the utilization or production of special nuclear material or atomic energy is found by a court of competent jurisdiction to have intentionally used such patent in a manner so as to violate any of the antitrust laws specified in subsection 105a, there may be included in the judgment of the court, in its discretion and in addition to any other lawful sanctions, a requirement that such owner license such patent to any other licensee of the Commission who demonstrates a need therefor. Such licensee shall pay a reasonable royalty fee, to be determined in accordance with section 157, to the owner of the patent.]"

Section 159 is renumbered section 158.

Section 160 is renumbered section 159.

Draft, March 13, 1959.

SECTION-BY-SECTION ANALYSIS OF PROPOSED BILL TO AMEND CHAPTER 13 PATENTS AND INVENTIONS (PREPARED BY AEC)

1. Section 1 of the proposed bill, changes the descriptive title of section 151 from the present inadequate "Military Utilization" to the more accurate "Inventions Relating to Atomic Weapons, and Filing of Reports."

2. Section 2 of the proposed bill would amend in three respects subsection c of section 151 of the act by:

a. Deleting as superfluous existing clauses (2) and (3) which read: "(2) in the utilization of special nuclear material in an atomic weapon; or (3) in the utilization of atomic energy in an atomic weapon", since they would appear not to embrace any

subject not covered by undeleted clause (1) which reads: "(1) in the production or utilization of special nuclear material or atomic energy."

b. Extending from 90 to 180 days—a more reasonable period—the time in which to file reports.

c. Deleting as superfluous the existing clause "whichever of the following is the later: either * * * day after completion of such invention or discovery; or the ninetieth" since it would appear not to embrace any circumstance not covered by the undeleted clause "after such person first discovers or first has reason to believe that such invention or discovery is useful in such production or utilization".

3. Section 3 of the proposed bill would amend section 151 of the act by adding a subsection e. This proposed amendment is self-explanatory and would merely afford express statutory sanction to existing Commission practice. The form of the proposed subsection e. follows closely that of 35 U.S.C. 122.

4. Section 4 of the proposed bill would amend in nine respects the too-broadly drafted section 152 of the act by:

a. Substituting the phrase "contract, subcontract or arrangement, entered into with or for the benefit of, the Commission" for the existing phrase "contract, subcontract, arrangement or other relationship with the Commission" wherever the latter phrase appears.

b. Substituting the phrase "contract, subcontract or arrangement," for the existing phrase "contract or arrangement" wherever the latter phrase appears. This substitution would be a corollary of the substitution discussed immediately above.

c. Substituting the phrase "in the course of or under" for the existing word "under" and the existing phrase "in the course of, in connection with, or under the terms of" wherever that word or phrase appears.

d. Substituting the clarifying phrase "shall be vested in, and be the property of" for the rather vague existing phrase "shall be deemed to have been made or conceived by" which appears in the first sentence.

e. Adding the clarifying parenthetical phrase "(unless the Commission advises the Commissioner of Patents that its rights have been determined and, therefore, no statement is necessary)" thereby obviating the necessity for a statement where the rights of the Government have been determined.

f. Substituting the clarifying phrase "as soon as the application is otherwise in condition for allowance" for the existing word "forthwith" which appears in the last sentence of the first paragraph and which has no express antecedent.

g. Substituting the phrase "under such" for the existing superfluous phrase "if made or conceived by any person at or in connection with any laboratory under the jurisdiction of the Commission as provided in section 31 or under such other" which appears in the first paragraph.

h. Adding the following sentence to the end of the last paragraph:

"A determination of rights by the Commission pursuant to a contractual provision prior to the request of the Com-

missioner of Patents for the statement, shall be final in the absence of false material statements or nondisclosure of material facts by the applicant."

This amendment is intended to afford the applicant reasonable assurance that should the Commission (although not required to do so) make the determination prior to the request of the Commissioner of Patents for the statement, such determination would be final in the absence of special circumstances warranting subsequent modification.

i. Providing that disputes will be settled by a court, rather than the Board of Patent Interferences. This amendment is effected by substituting the following phraseology:

"file a civil action against the Commission in the United States District Court for the District of Columbia. Such Court will have power to hear and determine whether the Commission was entitled to the direction filed with the Commissioner of Patents, and shall direct the Commissioner of Patents accordingly."

for the existing following phraseology appearing at the end of the third paragraph:

"request a hearing before a Board of Patent Interferences The Board shall have power to hear and determine whether the Commission was entitled to the direction filed with the Commissioner of Patents. The Board shall follow the rules and procedures established for interference cases and an appeal may be taken by either the applicant or the Commission from the final order of the Board to the Court of Customs and Patent Appeals in accordance with the procedures governing the appeals from the Board of Patent Interferences."

5. Section 5 of the proposed bill—the principal substantive proposal—would amend subsection h of section 153 of the act by extending the date set forth therein for 5 years, until September 1, 1964.

The Commission feels as it did in 1954, that patent incentives are a necessary and desirable stimulus to the development of peacetime uses of atomic energy. At the same time the Commission believes that the desirability of patent incentives must be balanced against the possibility of enlarging the preferred position of the necessarily limited number of companies, many of whom have developed their experience at public expense. The Commission believes that this balance can best be achieved through continuation, for an additional period of 5 years, of the compulsory licensing provisions of section 153, for as President Eisenhower stated in transmitting the 1954 atomic energy legislation to the Congress, "Until industrial participation in the utilization of atomic energy acquires a broader base, considerations of fairness require some mechanism to assure that the limited number of companies, which as Government contractors now have access to the program, cannot build a patent monopoly which would exclude others desiring to enter the field."

6. Section 6 of the proposed bill would amend in two respects section 155 of the act by:

a. Inserting the phrase "and patents for an invention or discovery" after the word "patents" and the phrase "or invalidate a patent covering" after the word "patenting", thereby

assuring that section 155 will be applicable to patents as well as applications for patents. In the absence of such a phrase, it would appear to be an open question whether section 155 could render invalid a patent inadvertently issued (either because of lack of knowledge of classified information on the part of the patent examiner, or notwithstanding such knowledge).

b. Inserting the phrase "the time applicant made or conceived the invention or discovery" after the word "before", thereby expressly resolving the latent ambiguity of whether that word refers to the time of filing the application, or of making the invention.

7. Section 7 of the proposed bill would amend section 157 of the act by adding as subsection d. a 6-year period of limitation. In the absence of an express period of limitation, doubt might arise as to whether any period of limitation exists. We note in this connection that a 6-year period of limitations is imposed in title 35, United States Code, section 286 with regard to suits for patent infringement, and the same period is imposed in title 28, United States Code, section 2401a with regard to civil actions against the Government.

8. Section 8 of the proposed bill would amend section 158 of the act by deleting it as superfluous, since Federal courts often without express statutory authority require in their antitrust decrees that patents be licensed. Furthermore, such decrees may not even require the licensee to pay royalties. Since section 158 requires the payment of a reasonable royalty fee, the patent owner may be subject to a less onerous penalty for violating the antitrust laws if the patents involved are subject to section 158 of this act.

9. Section 8 of the proposed bill would also amend sections 159 and 160 of the act by renumbering them as would be required by the deletion of section 158.

CHAPTER IV. VIEWS OF AEC PATENT ADVISORY PANEL

Transmittal Letter

U.S. Atomic Energy Commission,
Washington, D.C., March 4, 1959.

Mr. David R. Toll,
Joint Committee on Atomic Energy,
Congress of the United States.

Dear Mr. Toll: In a recent telephone conversation you requested a copy of the Patent Advisory Panel Report to the Commission. As explained, the panel members rendered individual reports and there is submitted herewith:

1. Mr. Oom's report of December 10, 1958, with accompanying outline;

2. Memorandum accompanying outline of views of John A. Dienner together with the outline dated November 14, 1958;

3. Brown's memorandum re suggestions of the Patent Advisory Panel for Revision of the Patent Sections of the Atomic Energy Act of 1954, dated December 5, 1958.

Sincerely yours,

A. R. Luedecke,
General Manager.

Chart outline of views of the panel members on ch. 13 of Atomic Energy Act (prepared by AEC)

	Brown	Dienner	Ooms
(1) Sec. 151. Military utilization:			
151a.:			
Strike out	X	X	
Keep as is			X
Amend			
151b.:			
Strike out	X	X	
Keep as is			X
Amend			
151c.:			
Strike out	X		
Keep as is		X	
Amend			X
151e.:			
Strike out	X		
Keep as is		X	
Amend			X
151d.:			
Strike out			
Keep as is	X	X	X
Amend			
(2) Sec. 152. Inventions conceived during Commission contracts:			
Strike out	X	X	
Keep as is			
Amend			X
(3) Sec. 153. Nonmilitary utilization:			
153a.:			
Strike out	X	X	
Keep as is			
Amend			X
153b.:			
Strike out	X	X	
Keep as is			
Amend			X

Chart outline of views of the panel members on ch. 13 of Atomic Energy Act—Con.

	Brown	Dienner	Ooms
(3) Sec. 153. Nonmilitary utilization—Continued			
153c.:			
Strike out	X	X	
Keep as is			
Amend			X
153d.:			
Strike out	X	X	
Keep as is			
Amend			X
153e.:			
Strike out	X	X	
Keep as is			
Amend			X
153f.:			
Strike out	X	X	
Keep as is			X
Amend			
153g.:			
Strike out	X	X	
Keep as is			X
Amend			
153h.:			
Strike out	X		
Keep as is			
Amend		X	X
(4) Sec. 154. Injunctions:			
Strike out	X	X	X
Keep as is			
Amend			
(5) Sec. 155. Prior art:			
Strike out	X	X	
Keep as is			
Amend			X
(6) Sec. 156. Commission patent licenses:			
Strike out	X		
Keep as is			X
Amend		X	
(7) Sec. 157. Patent Compensation Board:			
157a.:			
Strike out			
Keep as is	X	X	X
Amend			
157b.:			
Strike out			
Keep as is			X
Amend	X	X	
157c.:			
Strike out			
Keep as is			X
Amend	X	X	
(8) Sec. 158. Monopolistic use of patents:			
Strike out	X	X	X
Keep as is			
Amend			
(9) Sec. 159. Federally financed research:			
Strike out			
Keep as is			X
Amend	X	X	
(10) Sec. 160. Saving clause:			
Strike out			
Keep as is			
Amend	X	X	X
(11) Shall we put inventions in the field of atomic weapons under the general law of patents?			
Yes, now	X		
Yes, later		X	
No			X
(12) Shall we put all inventions in the field of atomic energy (outside of weapons) under the general law of patents?			
Yes, now	X [1]	X	X [2]
Yes, later			
No			
(13) Shall we drop the compulsory license feature on nonmilitary use, sec. 153?			
Yes, now	X	X	
Yes, later			X
No			

[1] Including weapons.
[2] As rapidly as possible.

Separate Report of Casper W. Ooms, Member of Patent Advisory Panel, on Possible Revision of Patent Provisions of the Atomic Energy Act of 1954

This report attempts briefly to summarize my conclusions and recommendations to the Atomic Energy Commission with respect to the revision of the patent provisions of the Atomic Energy Act of 1954. It is based upon statements made by industrial representatives and patent attorneys who appeared at the open Patent Advisory Panel meeting on April 15, 1958, various publications and statements that have appeared with respect to this legislation, the staff memorandum of August 29, 1958, by the Office of the General Counsel to the Patent Advisory Panel, and the individual view of the members of the Panel.

Throughout the history of the atomic energy legislation there has been a sincere and vigorous expression of criticism of the patent provisions of the Atomic Energy Acts of 1946 and 1954, and considerable criticism of the patent provisions contained in the Atomic Energy Commission contracts. Much of this complaint has been based upon general considerations of customary patent policy and the generally satisfactory experience of American industry with the U.S. Patent Act, from which the provisions of the Atomic Energy Act depart to some extent. Very little of the criticism that has been voiced is documented with actual experience or demonstrated deficiencies in the patent program of the Commission. This may be in part due to the brief experience available in this technology and the unconventional conditions of the emerging atomic energy industry. Nevertheless, the criticism has been widely voiced by many responsible executives and patent attorneys, as well as occasionally by Members of Congress. Hardly any of the hearings of the Joint Committee relating to atomic energy problems have been free of some critical expressions directed toward the patent provisions of the Atomic Energy Act.

We are all agreed that atomic energy legislation should be under constant scrutiny and reexamination and that, wherever possible, the patent policy of atomic energy legislation be brought into harmony with the general patent law as rapidly as is practicable. This does not mean that there should not be, where need for exceptions is shown, some departure from the provisions of the U.S. Patent Act. Whether any exceptions should be tolerated, and, if so, where, forms the subject of irreconcilable controversy.

The patent provisions of the Atomic Energy Act of 1954 are contained in sections 151 through 160, inclusive, and the following comments are directed to those sections in the order of their serial numbering.

Section 151. Military utilization

Section 151a: Forbids the patenting of inventions "useful solely in the utilization of special nuclear material for atomic energy in an atomic weapon" ("atomic weapon" is defined in sec. 11d and apparently embraces only the effective portion of a weapon as distinguished from transporting or propelling devices). The section also nullifies any patent previously granted for such invention, and orders just compensation to be made therefor.

Apparently no patent of this type has ever been issued, and the revocation clause is ineffective.

This provision represents a much more limited restriction upon the patenting of inventions in the field of atomic energy technology than the act of 1946. Objections are made to the provision largely on the ground that incentives are necessary in the development of military inventions, and that the departure from general patent practice is, therefore, likely to repress rather than increase inventive activity in this field. Weapons generally are not separated in the Patent Act from other inventions, nor are patents thereon forbidden or restricted. This provision, therefore, represents a substantial departure.

Against this position it is argued that the efficacy of a military weapon is frequently increased by the secrecy which attends its existence and use, that there is but one customer for military weapons—the sovereign government and its allies—that since the government has freedom under other provisions of the patent statute (title 28, U.S. Code, sec. 1498) to make and have made for it patented inventions subject only to liability to the patentee by litigation of claims in the Court of Claims, there is really no benefit conferred by a patent upon a military weapon. In addition, the U.S. defense procurement authorities invariably require multiple sources of military supplies. Some of these sources operate in defiance of patents and cannot be enjoined under a patent. In many respects a patent on a military weapon is emasculated, and its possession a delusion.

Historically, of course, the production of atomic weapons has been maintained in attempted secrecy which would be penetrated by patenting. To some extent the dangers of disclosure have been overcome by excessive delays in handling the patent applications in the Patent Office, and in some countries by the absurd device of granting but not publishing "secret patents".

Great Britain has long maintained a generous and effective award system for inventors of military weapons, and has liberally rewarded the inventors of the jet engine, the Bailey Bridge, etc.

Section 151b. Limits any patent granted after the passage of the act by stripping its owner of any rights "with respect to any invention or discovery to the extent that such invention or discovery is used in the utilization of special nuclear material or atomic energy in atomic weapons." The statute also strips such rights from previously granted patents and imposes an obligation on the United States to pay for just compensation for such partial nullification.

The same comments that have been made with respect to section 151a are applicable to this provision.

Section 151c is more sweeping in the subject matter to which it relates in that it requires the inventor or discoverer of any invention useful in the production or utilization of nuclear material or atomic energy, or in the utilization of such material in an atomic weapon, to file with the Atomic Energy Commission a report describing the invention (unless he has filed a patent application on it) within 90 days after he completes the invention, or first discovers that it is useful in the manner expressed in the statute.

It is the consensus of the Patent Advisory Panel that this section could be greatly shortened and clarified inasmuch as the categories of invention defined in the section overlap each other and are all embraced within the first category, but that the time limit prescribed in the statute is probably too short and should be at least doubled.

Section 151d requires the Commissioner of Patents to notify the Atomic Energy Commission of all patent applications embracing the subject matter mentioned in 151c, and give the Commission access thereto. This section is believed to be unobjectionable.

Section 152. Inventions conceived during Commission contracts

Section 152: This provision of the statute has elicited more complaint than any other because it places every patent application upon a nuclear invention under a cloud, and enables the Atomic Energy Commission to invoke an exceedingly summary procedure to require the issuance of the patent to the Commission if the invention was "made or conceived under any contract, subcontract, arrangement, or other relationship with the Commission", whether paid for by the Commission or not. The section also remits any contest as to the title of such inventions to the Board of Patent Interferences of the U.S. Patent Office.

The section also contains an exception that permits the Commission to waive its claim, otherwise enforcible under section 152.

The objections to this section arise from two fundamental considerations: The first is the sweeping and rather ambiguous language attempting to define the conditions under which the Commission may demand the issuance of a patent to it; the second arises from the fact that the Board of Patent Interferences is not as well equipped as a court to conduct a trial of the questions that would arise in the enforcement of this provision.

It is recommended that the provision be redrafted to—

(1) limit its applicability to work done under contractual arrangements out of which the invention arises;

(2) provide expressly that the provision shall have no application where the contractual arrangements contain express terms as to the ownership of patents arising in the performance of the contract; and

(3) provide that any questions arising under the section may be tried in the U.S. district court, either for the district in which the patent applicant resides or, at his election, the District of Columbia.

There may be some question whether this last suggestion of having the litigation conducted in the U.S. district court might not invade the traditional secrecy of Patent Office proceedings. Of course, Patent Office proceedings have traditionally, and more recently by statute (title 35, U.S.C., sec. 122), been maintained in secrecy. Even the release of certain opinions is suspended until the patent application is finally acted upon and the patent has gone to issue, or has been finally rejected. Nevertheless, there are certain types of patent cases, such as the so-called 4915 actions and other actions brought against the Commissioner, which involve proceedings in which an application is pending. There would therefore appear to be no fatal obstacle in having proceedings of the kind which would be brought under what was section 152 brought into the U.S. district court. Undoubtedly the proceedings would come so late after the filing of the application that any dangers inherent in exposure would have been obviated by the lapse of time, and if special precautions were necessary to protect either the patent applicant or the United States, the district court could order the appropriate safeguards in the proceedings.

Section 153. Nonmilitary utilization

This section contains a number of provisions which provide for so-called compulsory licensing of patents in the fields of nuclear technology under the specified conditions that the invention or discovery covered by the patent "is of primary importance in the production or utilization of special nuclear material or atomic energy," and that "the licensing of such an invention or discovery * * * is of primary importance to effectuate the policy and purposes of this act."

The section proceeds with the detailed provisions of how compulsory licensing proceedings may be initiated either by an applicant who is unable to arrange terms with the patent owner, or by the Commission itself, and then provides for the procedural steps necessary for the declaration under which compulsory licensing is available.

Fundamentally, *compulsory licensing is a violation of the essential concept of a patent system.* The entire theory of the patent system is that the owner of the patent, because of the contribution of the inventor, becomes *exclusively* entitled to the exploitation of the invention during 17 years. Any procedure which either reduces this term of years or invades the exclusive opportunity of the patentee or patent owner to exploit the invention and to exclude others from its use necessarily reduces the value of the patent and contradicts the fundamental feature of a patent, which is the grant of the power to exclude. Throughout the history of the United States, there has developed an attitude that compulsory licensing is abhorrent to the patent system and the industrial activities which have in part depended thereon. The result has been an almost universal disapproval of any forms of compulsory licensing. Nevertheless, there is considerable compulsoryl icensing in the United States: First, that produced by the statutes which permit the United States itself to contract for the use of a licensed invention without being subjected to interference by injunction and confining the liability of the United States to a suit for damages in the Court of Claims. Second, a great number of statutes relating to recent Government operations, such as dam construction, the extraction of fuels from shale, the development of space vehicles, etc., have express provisions which enable the United States, or the agencies to which these various activities have been assigned, to employ patents without liability to injunction and, in some cases, without any liability whatsoever. Third, there is, of course, also a tendency in antitrust cases where the violation of the antitrust laws has been dependent upon or has involved the use of patents for the court, upon the entry of a decree holding a violation of the antitrust laws, to require the patent owner to dedicate the patents or to license them for use by others either without royalty or upon terms to be fixed by the court, etc.

The provision in the atomic energy legislation of 1946, which provided for compulsory licensing of the same kind but under less specific terms and conditions than those outlined in the act of 1954, was designed to prevent interference with the development of atomic energy by an obstinate patent owner who might be unwilling to permit others to use his invention. The legislation dealing with nuclear technology is now more than 12 years old, and no occasion has arisen for the invocation of the power of the Commission to declare a patent affected with the public interest and therefore subject to compulsory licensing. Part of this is undoubtedly due to the fact

that most of the inventions in this field have been made by the Atomic Energy Commission or its employees and contractors, with the accrual of all patent rights to the Government, and part of it may be attributed to the fact that the presence of this provision in the law does encourage the voluntary licensing by patent owners in the field, although no instance of this can be found in the entire literature which has developed from our atomic energy legislation and experience.

Probably no other provision of the atomic energy legislation of 1946 and 1954 has invoked as much criticism as this provision. Much of this criticism has been the expression of the traditional attitude against compulsory licensing, and some of it is based upon a real fear that anything which detracts from the value of a patent will inevitably weaken the incentives necessary to encourage development. When the provision was first put into the Atomic Energy Act it was done with the thought that there might be inventions and developments in the field of nuclear technology which would be overwhelming and dominating and would thus entrust to a single patent owner a power which might, if not wisely exercised, interfere with the expected development in nuclear invention and exploitation. There have been but few occasions in the history of invention and technology where dominating patents have appeared; in most cases where this has occurred the patent owner has wisely permitted the use of the invention and thus broadened the base of its utilization and, necessarily, the base of any return he procured thereon, or has exploited it to its full demand. That this may not always be so is the single contingency against which a provision for compulsory licensing might be necessary and justified.

In some of the debates and hearings upon the legislation which culminated in the act of 1954, one of the most vigorous opponents of this provision stated that in the event a patent of dominating scope appeared and the owner refused to permit its utilization and thereby interfered seriously with the development of nuclear technology, Congress could enact suitable legislation to care for that contingency. This would be constitutionally doubtful. The only constitutionally secure method of providing against the contingency of the appearance of a dominating patent and its utilization under conditions that might interfere with developments in the atomic energy field, would be by a compulsory licensing device. Even the power of the Commission to purchase patents depends upon the voluntary cooperation of the patent owner, and while in most cases this would undoubtedly be available both for material and patriotic reasons, the exceptional situation may arise where only the invocation of the power of compulsory licensing may overcome the obstacle.

The panel is not unanimous upon what should be done with the compulsory licensing provision of the act. Industry is generally and almost uniformly opposed to the presence of any compulsory licensing provision in the legislation. Since it is for industrial protection that this extremely limited compulsory licensing has been provided for, and industry's thoughtful study has led to a unanimous condemnation of this provision, the risk may be negligible. If so, the provision for compulsory licensing could be stricken.

Undoubtedly the present terms of the legislation can be more clearly expressed to disclose that the compulsory licensing provision

is an emergency reserved power to be invoked only in extreme conditions, and then only where all voluntary efforts between the patent owner and the prospective licensee fail, and where the consequences are clear that there will be serious interference with nuclear development.

By its own terms, the statute will apply only to patents for which applications have been filed before September 1, 1959, although of course such patents may not issue for several years and there will therefore be a continuing power of compulsory licensing with respect to such patents.

Section 154. Injunctions

This provision is unnecessary if, in the rewriting of the statute, any provisions with respect to compulsory licensing are appropriately expressed.

Section 155

Section 155 expresses an extremely fundamental departure from almost all of the law of patent systems throughout the world. The entire theory of the patent system is that the system will encourage the development and publication of an invention. Under section 155, although there is a secret development and a concealed knowledge of the disclosure in the possession of the Atomic Energy Commission, a subsequent and independent inventor may, by the mere existence of such unavailable information, be deprived of his rights to a patent. All other bars to a patent are dependent upon the public's having access to the knowledge which is the basic bar to the granting of a valid patent. The purpose of this section could be much better served if instead of making such secret, undisclosed knowledge a bar to the patenting of an invention and therefore a basis for invalidating a patent issued to an independent inventor, the knowledge were merely permitted to be a defense to infringement by the Atomic Energy Commission.

Section 156. Commission patent licensing

It has been the practice of the Atomic Energy Commission to issue free licenses under any patents owned by it. It has been proposed at times that this practice be modified by offering such patents for licensing or sale on a commercial basis with revenue to the Atomic Energy Commission. Such a commercial exploitation of patents owned by the United States or one of its agencies would constitute a fundamental departure from more than a century of traditionally free licensing. This would necessarily involve the corollary practice that suits be brought against unlicensed users of the inventions covered by such patents either by the United States or its licensees.

Before any such fundamental departure be taken from the policy of free licensing, certainly further investigation of the wisdom of the policy should be undertaken. It is my recommendation that the present practice of free licensing continue and that the Atomic Energy Commission itself be permitted to work out the administrative procedures for effecting the licensing and for securing such statistical information from the licensees as may seem desirable.

Section 157. Compensation awards and royalties

This is a rather elaborate section of the statute which sets up the Patent Compensation Board and outlines the procedures and standards

which it shall follow in determining just compensation, reasonable royalties, and awards provided for in the act.

All of the functions of this Patent Compensation Board could very readily be transferred to a court or to the several courts of the United States sitting throughout the United States. The number of claims involved under this section have been so few (less than 35 at this time) that any elaboration of the Board or transfer of its functions seems undesirable. The use of a part-time Board composed of citizens having special qualifications to deal with the problems entrusted to the Board and having no other employment with the Commission than as members of the Board, has apparently met with satisfaction.

Awards.—The section does contain a provision for the granting of awards to inventors or discovers who make contributions "in the production or utilization of special nuclear material or atomic energy" who have reported their inventions or discoveries to the Commission and who are not entitled to just compensation nor the reasonable royalties provided for in other sections of the act. This is an entirely voluntary and discretionary procedure which has, up to this time, resulted in the making of only a single award where the purchase of patents was not involved.

This section also confers power to the Commission to grant an award upon the recommendation of its General Advisory Committee, with the approval of the President, for "any especially meritorious contribution," and an annual award has been made under this provision successively to Drs. Enrico Fermi, John Van Neumann, and Ernest Orlando Lawrence.

There is no doubt but that the availability of an award system has merit, particularly in an art where patentability is denied to certain inventions such as those of the utilization of nuclear materials or atomic energy in a military weapon. If an award is to continue to be available, the use of the Board for the granting of such an award is desirable. The evaluation of patent rights is somewhat specialized. Although the function of determining just compensation or reasonable royalties under the other provisions of this statute are necessarily a special form of evaluation with which most courts have had little, if any, experience, the function could be performed by the courts, although perhaps not with the facility of a Board selected of men whose experience has been greater in the field of patent problems. The Board thus far has been composed of such men and it is therefore believed that if the award system is to be maintained, which is recommended, this section of the statute requires little change. The Board would also prove useful in the determination of just compensation under the statute, and in fixing reasonable royalties if compulsory licensing is provided for.

Section 158. Monopolistic use of patents

This provision is entirely superfluous as the power which it apparently confers upon courts of equity has long been exercised as an inherent power by those courts in cases where patents were employed in violation of the antitrust laws.

Section 159. Federally financed research

This section expresses congressional approval of the policy that has continuously been followed successively by the Office of Scientific

Research and Development, the Manhattan District, and the Atomic Energy Commission in its contracting policy. In these contracts it has been regularly required that where the contract calls for federally financed research, the patents which ensue from the work performed under the contract accrue to the United States. The provision should be retained as it is merely a permissive provision and does not dictate the details of the policy and procedure to be followed by the Atomic Energy Commission. Necessarily, flexibility in that policy is not only necessary but wise.

Section 160. Saving clause

Section 160 was put into the 1954 act because under the 1946 act certain patents were denied in specific fields of nuclear technology in which they were not denied by the act of 1954, and it was there provided that anyone who had been denied a patent in these fields under the earlier act could renew his application under the act of 1954.

In the event that there are substantial modifications of the patent provisions of the Atomic Energy Act of 1954, it will undoubtedly be desirable that some type of saving clause be incorporated into the act. What the nature of such saving clause may be depends entirely, of course, upon the revisions that are effected in the 1954 legislation.

CASPER W. OOMS,
Member, Patent Compensation Board.

CHICAGO, ILL., *December 10, 1958.*

MEMORANDUM ACCOMPANYING OUTLINE OF VIEWS
JOHN A. DIENNER

1. *Section 151. Military utilization.*—I have voted to strike out subsections a. and b. but as shown in my answer to question 11, it might be preferable to do this later.

Re 151 c. and d. relating to reports, I would continue these reports whether or not atomic weapons are eliminated from the act.

2. *Section 152. Inventions conceived during Commission contracts.*—I would strike out section 152 and rely upon the law as established in *United States* v. *Dubilier* (289 U.S. 178). I recommend that Atomic Energy Commission be permitted to exercise the same liberality of interpretation that the other agencies of the Government are permitted in this direction. Since the circumstances involved have a direct bearing upon the type of contract, I would give the contracting officer the power to determine the applicability of the Dubilier decision in advance of writing the contract, and then recite the result of his determination in the contract.

3. *Section 153. Nonmilitary utilization.*—I vote to strike out all of section 153. Rights originating under paragraph 153 in all patents the applications for which were filed before September 1, 1959, should of course be retained as by a saving clause such as section 160.

4. *Section 154. Injunctions.*—This should be repealed with a reservation of its continued applicability to rights which have accrued prior to its repeal.

5. *Section 155. Prior art.*—This should be repealed, since it constitutes an exception to the general law of patents and no particular need has been shown for it in this field which could not also be asserted

in connection with any other Government department. At present, this section introduces an unnecessary uncertainty in a system of granting patents which inherently has too many uncertainties to begin with. I should not favor a personal defense based on such evidence, since the general patent law does not recognize any personal defense except as it is based upon something which the owner of the patent himself did.

6. *Section 156. Commission patent licensor.*—I recommend that this section 156 be repealed, and that Congress set up machinery for enforcing patents owned by the Federal Government and for granting royalty-bearing licenses. These licenses should normally be nonexclusive, but under circumstances justifying it, they might be exclusive.

I would favor the establishment of a Government corporation, like the British NDRC, with power to deal in the United States and foreign countries on AEC patent matters including the collection of royalties, both domestic and foreign.

7. *Section 157. Patent Compensation Board.*—I would keep 157 a. substantially as it is, since such a Board is useful to the Atomic Energy Commission. I would omit 157 b. (1), since I have voted to eliminate compulsory licenses, and I would continue the Board to carry out the findings on "just compensation" under b. (2) and b. (3) and also 157 c. The reason for retaining these is to keep the jurisdiction of the Board on items which had accrued under sections b. (2), b. (3) and c., prior to amendment of the act.

8. *Section 158. Monopolistic use of patents.*—I vote to strike out this section, since the Antitrust Acts in force are ample to take care of this situation.

9. *Section 159. Federally financed research.*—I would strike out this provision, and rest on the law in the Dubilier case above referred to, 289 U.S. 178, or if a specific standard were required, then I would write into the statute the standards of the Dubilier case to peg the interpretation of the same.

10. *Section 160. Saving clause.*—A saving clause is necessary to cover rights accrued prior to amendment of the act.

11. While I favor putting inventions in the field of atomic weapons under the general law of patents, I feel that this might well be deferred until a later revision comes up, in the hope that the threat of the use of atomic weapons is less pressing.

12. I think this is the question which most of the representatives of industry at our April 15 meeting were most urgently concerned with, and wanted us to answer in the affirmative. They want atomic energy (possibly excepting weapons) to be treated like any other field of invention under the general patent laws.

13. Outside of the military field, there is nothing concerning inventions in atomic energy which requires treatment any different from inventions in the field of steam, gas, or electrical energy. As I have pointed out elsewhere, the Federal Government has the power of eminent domain. So have the States. Furthermore, if any case of a psychopathic patent owner arose, we could deal with such person as we could with any psychopathic individual. Industry says it is afraid of the compulsory license feature, and I think it would be desirable to remove their fears on this item by revoking section 153.

JOHN A. DIENNER.

CHICAGO, *November 14, 1958.*

Brown's Memorandum re Suggestions of the Patent Advisory Panel for Revision of the Patent Sections of the Atomic Energy Act of 1954

This memorandum states the writer's individual advice regarding changes in the patent sections of the 1956 Atomic Energy Act. It is understood that the Chief of the Patent Section proposes to consolidate the statements of the three patent advisory panel members in a document or documents to be supplied to the Commission.

By way of preface to the present memorandum and my comments upon the respective recommendations of Messrs. Ooms and Dienner, it is pertinent to say, as I have set forth in considerable detail in the two prior communications, that I believe the fiat ownership of atomic energy inventions, and the taking out of patents thereon in the United States and abroad in the name of the AEC, is a mistake of policy resulting in much useless expense, producing patents of no practical value as patents, and will be distinctly prejudicial to industrialists of this country in their future efforts to compete in atomic energy exploitation in foreign countries. I believe the present Atomic Energy Patent Act, in practical effect, is equivalent to providing that most U.S. patents in the atomic energy field do not function as patents, and that patents that would be of material value here and abroad to U.S. industry, if those patents were owned by our citizens, are being in effect abandoned for the benefit of the world wide public. AEC patents in practical effect seem to be effective merely as publication establishing dates and priorities for defense against later inventors.

The present atomic energy patent statute substantially lessens the normal incentive to invent, and to exploit patented inventions, in the atomic energy field. I believe the substantial limitation of such incentive by the present law and practice has retarded, and will continue increasingly to slow invention, improvement, and industrial applications of atomic energy in this country, and will hamper our citizens in their efforts to obtain business in this field in foreign countries.

With the foregoing résumé of my basic conclusions as a background, I proceed with comment and recommendation as to each specific patent section of the act.

Following Mr. Dienner's suggestions, I attach at this point a copy of his tabulation of items involved, with my votes indicated thereon.

Using the memorandums of Messrs. Ooms and Dienner with respect to each of the sections of the act as a format, I submit the following specific comments, using the paragraph numbers and headings as in Mr. Dienner's memorandum.

1. Section 151. Military utilization

I agree with Mr. Dienner in recommending the striking out of subsections (a) and (b). I think this should be done now.

I would also strike out section (c) requiring reports of all AE inventions. This requirement seems an onerous burden on industry and independent researchers, and no longer necessary. Probably it was deemed necessary at a time when military importance and secrecy were paramount, and when it was thought that the United States had and could maintain a monopoly on the basic technology of the utilization of atomic energy. That premise has apparently gone with the wind.

Paragraph (d) seems to be in accord with other statutes and principles relating to inventions primarily of military importance, and therefore proper, although apparently it adds little if anything to prior general statutes. If retained and if (c) is stricken out, (d) should be amended to limit the requirement to inventions as to which the AEC should have prompt knowledge. Without attempting to define them, it seems to me there must be many kinds of AE inventions on which the reporting of patent applications would be of no real value or usefulness to AEC; (c) defines such inventions too broadly.

Prohibiting patents on weapons utilizing atomic energy seems to me to have been a mistake from the first. With all the efforts and vast disbursements that are being made by the Department of Defense to develop atomic energy weapons and accessories, all possible incentive to spur patentable invention by civilians of military weapons should be encouraged, not prohibited. Other forms of military weapons may be patented, and have been. Some inventions of great importance to our defense and security have been made by civilians. Since the Government has the right to utilize all such inventions, and to hold such inventions secret so far as publication of patents is concerned, subject to compensation under existing statutes, the prohibition of patents on atomic energy weapons seems unwise and unnecessary. It may well be prejudicial to the overall defense effort.

2. Section 152. Inventions conceived during Commission contracts

I believe this section should be repealed. The representatives of productive industry who appeared at the April 15 meeting were substantially in agreement in objection to the requirements of this section under which all substantial inventions made by contractors become the property of AEC. I believe the extraordinary requirements of this section, and AEC practice under it, if ever justified, are no longer fair to contractors, or in the best interests of the United States and its citizens. While, as Mr. Ooms suggests, this section could be amended to liberalize it, and while as industry suggested, AEC could remove some of its objectionable features by broad and published general waivers, it seems to me the clean cut way to meet the situation would be to eliminate the entire section. As Mr. Dienner points out, the interest of the United States under inventions produced by contractors while acting for the United States can be protected by the terms of the contracts, consistent with established patent law, as is now done by the Department of Defense.

3. Section 153. Nonmilitary utilization

I agree with Mr. Dienner that this section should be stricken out. I disagree with his position that rights arising under this paragraph on all patents issued on applications filed before September 1, 1955, should be retained.

Without rearguing the advisability of compulsory licensing power of AEC in this field, I point out that although Mr. Ooms desires to retain that power under this section, he states his belief that "compulsory licensing fundamentally is a violation of the essential concept of a patent system", that * * * it "contradicts the fundamental feature of a patent", that there has been developed a public attitude that "compulsory licensing is abhorrent to the patent system" * * *,

and that there has been "almost universal disapproval of any form of compulsory licensing". (Ooms, p. 9).

4. Section 154. Injunctions

In my opinion this section should be repealed. I do not agree with Mr. Dienner that there should be reservation continuing its application to rights accrued prior to its repeal. I see no need for such a qualification.

Mr. Ooms seems to agree that this section is unnecessary if the section relating to compulsory licenses is suitably amended and restricted. If he should agree that section 153 should be eliminated, he would probably agree that section 154 should also be stricken.

5. Section 155. Prior art

This section provides that prior secret knowledge "within the atomic energy program of the United States" shall be a bar to patenting of inventions in the atomic energy field. As Mr. Ooms says, this law establishes "an extremely fundamental departure from almost all of the law of patent systems throughout the world."

Mr. Dienner points out that such effect of secret knowledge is an exception to the general law of patents and that no particular need has been shown for it in this field, and that it introduces an unnecessary uncertainty in our system of granting patent. He does not favor even a personal defense based on such secret prior knowledge, whereas Mr. Ooms suggests that at most such secret knowledge should constitute a defense to infringement by the Atomic Energy Commission.

I am inclined to agree with Mr. Dienner.

6. Section 156. Commission patent licenses

Both Mr. Ooms and Mr. Dienner qualify their advise regarding this section. Mr. Ooms apparently disapproves the statute if its effect is to permit AEC to offer its patents for restricted licensing on a commercial basis, with revenue to AEC. He says that such exploitation of patents owned by the United States or one of its agencies would "constitute a fundamental departure for more than a century of traditionally free licensing." He recommends that the present practice of free licensing continue and that details for granting such licenses be worked out by administrative procedure within the Commission.

Mr. Dienner recommends that section 156 be repealed, but adds the recommendation that Congress set up machinery for dealing with Government-owned patents. He suggests the establishment of a Federal Government-owned corporation with power to deal in United States and foreign patents, including the collection of royalties both domestic and foreign. Doubtless purchase and sale of patents would be included in the operations of such a corporation.

Believing as I do that patents owned by AEC or the United States are in practical effect open to all U.S. citizens with or without formal licenses, it follows that restricted individual licenses under, or sale of, its patents by AEC, should not be authorized or directed. The section therefore seems superfluous and is misleading. I think it should be repealed.

As to setting up a Federal commission or corporation to deal in U.S. patents and rights thereunder, I think that for the United States to go into the business of buying, selling, and licensing United States and foreign patents for profit, would be objectionable and unwise for many reasons, and would meet with almost universal disapproval by industry and the patent bar.

7. Section 157. Patent Compensation Board

Government personal monetary voluntary awards seem to me bad as a matter of principle and expediency. They are likely to produce political recriminations, to lead to jealousy and dissatisfaction among coworkers, and to be based upon records and personal factors which would not stand the normal tests of admissible evidence and judicial procedure. They are colorably analogous to ecclesiastic dispensation. It seems to me that section 157 has been used argumentative to justify the exclusion of the atomic energy field from our general patent system. In other words, having removed much of the incentive to industry to make inventions in this field, the award section has been inserted in the Atomic Energy Act ostensibly to excuse or mollify elimination of normal benefits of the general patent system in this special field. It is far from being an adequate substitute or equivalent. If the general patent law were applied to atomic energy there would be no more need or excuse for the award system here than in many other fields of industry.

I do not urge repeal of this section, because up to the present time it has produced no serious basis for objection by the public. It is being administered by an outstandingly competent Board. It relieves the Commission of much detail. In form it needs little, if any, change, if it is to be continued.

8. Section 158. Monopolistic use of patents

I agree with Mr. Ooms and Dr. Dienner that this section is superfluous and should be repealed.

9. Section 159. Federally financed research

If this section be construed, as Mr. Ooms interprets it, as merely permissive and not directive in any position sense, then it seems superfluous and possibly misleading. If it could by implication require that all patents based on invention made or conceived during the course of federally financed research or operations be assigned to the United States and thereafter regarded as patents that could be dealt with as though owned by private citizens, then the entire section should be striken out. I am inclined to agree with Mr. Dienner in his comment and advice on the section.

10. Section 160. Saving clause

I agree with the second paragraph of Mr. Ooms' comments as stated on page 18 of his memorandum.

JO. BAILY BROWN.

DECEMBER 5, 1958.

EXCERPTS FROM 1947 REPORT OF PATENT ADVISORY PANEL

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., September 17, 1947.

The ATOMIC ENERGY COMMISSION,
Washington, D.C.

GENTLEMEN: We herewith transmit our first report on the patent problems of the Atomic Energy Act.

In January 1947, your Commission, acting under section 12(a)(1) of the Atomic Energy Act, appointed an advisory panel to recommend to the Commission policy, procedures, and staff organization for the effectuation of the patent provisions of the act. This panel originally included Casper W. Ooms, then U.S. Commissioner of Patents, William H. Davis, Chairman of the Department of Commerce Patent Survey Committee, and John A. Dienner, former president of the American Patent Law Association.

The panel met with the Commission, its General Manager, and General Counsel and undertook a preliminary survey of the problem in that month. In July 1947 the advisory panel was enlarged by the addition of Hector M. Holmes, an active practitioner in patent litigation, of the Boston bar.

Throughout the summer of 1947 several members of the panel devoted most of their time to the study and the preparation of this report and met frequently with members of the Commission's staff and operating personnel. The General Manager, General Counsel, Patent Adviser and many other associates were interviewed; the contracts employed by the Atomic Energy Commission were examined and studied; the Patent Office officials were consulted with respect to aspects of the problem which involved procedures and problems before that Office in the handling of applications for patents upon inventions in the field of atomic energy; and public reports and other documentary materials bearing upon the legislative history of the Atomic Energy Act and the problems of control of atomic energy were studied.

Our report is necessarily limited largely to the problems of the greatest urgency and, because of the lack of any history of experience under the act or comparable legislation, must necessarily be somewhat tentative in character. It is contemplated that several phases of the subject will be developed more fully in the early future and made the subject of subsequent reports.

WILLIAM H. DAVIS.
JOHN A. DIENNER.
HECTOR M. HOLMES.
CASPER W. OOMS.

REPORT OF PATENT ADVISORY PANEL

PART I. HISTORY BEARING UPON PATENT PROVISIONS OF THE ACT

Patent policy prior to atomic energy

Until the utilization of atomic energy became possible the freedom of the Government to use patentable inventions and discoveries was adequately safeguarded under the act of June 25, 1910, as amended (U.S.C. title 35, sec. 68), by which the right of the Government and its contractors to use any patented invention or discovery, is subject only to payment by the Government of compensation for such use.

Progress of science and useful arts was almost wholly in the hands of private persons because the facilities for the production of goods and the facilities for research and development of new processes, devices, and products were likewise almost wholly in private hands. Research of a purely scientific character was largely carried on by institutions such as colleges and universities and endowed institutes, the chief results being the discovery and dissemination of new knowledge thrown open to the public by publication.

With the advent of World War II with its concept of total war, this situation of necessity was changed.

General patent policies of OSRD

The Government took over the direction of war production and in many cases established its own facilities for insuring production of goods needed to prosecute the war. It established a central authority for guiding the development of new devices or the improvement of known devices which were deemed useful for the defensive-offensive operations of total warfare. This function of guiding the invention and development of needed devices, processes and methods was largely performed by the Office of Scientific Research and Development under Dr. Vannevar Bush. Certain specialized fields of invention and development were centered in other authorities, but the general field was assigned to OSRD. When a project reached the stage of manufacture, it was generally turned over to a procurement agency.

With minor exceptions the work of devising and developing to the stage of manufacture any specific product, process or device was done under contract made by OSRD on behalf of the Government with such private person or organization as was best equipped to do the job. Since such projects ranged all the way from the investigation of basic scientific questions down to the production of specific gadgets, inventions and discoveries were to be expected and many did in fact result.

The policy concerning the allocation of rights in and to inventions and discoveries and patents thereon, followed, in general, the previous practices of the Army and Navy in the development of special devices, i.e., the scope of rights to be granted to the Government depended upon the nature of the subject matter and the patent and industrial position of the contractor.

Atomic energy demanded different treatment

When the proposal to pursue the development of atomic energy by nuclear fission was entertained, a new situation was presented. It was shortly realized that the potentialities of this new development were so great that the project must be completely under the control of the Government. Atomic energy offered the possibility of both a better life and a worse death, and which it would be depended solely upon the intent of the user. The immediate objective was a military weapon, but the social implications and possibilities of utilization of this new agency for improving the lot of mankind were fully realized from the start.

The project began as others had begun, namely, by making the usual types of contracts of employment with qualified individuals and organizations to perform particular parts of the project, but the tremendous importance of the development shortly indicated that every phase of the project so far as possible must be owned by the Government and must be carried out with complete secrecy.

It became clear that it would not be enough for the Government to own all the facilities for production, but that the Government should be in position to own as well all inventions, discoveries, know-how, and even all information involved in each and every phase of production or utilization of atomic energy, to keep its military potentialities secret, to keep the use of such dangerous and revolutionary agency under complete control everywhere and to provide complete freedom for research and development in this field.

Patent policies peculiar to atomic energy

Under direct orders of the President, OSRD was, in 1942, instructed to secure complete patent control of all inventions and discoveries essential to the production and utilization of atomic energy. This involved a special patent policy in this field. All contracts in this field were made pursuant to this policy, and such as had been previously made were renegotiated to conform to that policy.

International implications

It was early realized that this Government, if it had complete patent control, would be in a dominant patent position throughout the world if and when the situation arrived where the various inventions and discoveries could safely be made public.

Complete control by way of secrecy of the necessary processes, products, and devices, as well as know-how and other information could be a powerful instrument to induce international agreement to set up a system under which such knowledge could be released with assurances of safety.

Secrecy was less likely to fail under complete control by the Government of all facilities, and the employment of all competent scientists familiar with the subject. This was the wartime status.

PART VIII. CONCLUSIONS AND RECOMMENDATIONS

(1) The legislative history of the act and the intrinsic provisions of the act indicate the intention of Congress to provide procedures for insuring complete freedom from interference from patents in all activities of the Commission and its activity licensees and researchers in the field of atomic energy.

Only to the extent deemed by Congress necessary to insure this freedom does the act make any direct change in the patent laws. A direct change is in section 11(a)(1) declaring certain subject matter not to be subject of patent grant. (Revocation of past grants is merely a method of making the change retroactive.)

Rights of exclusion in patents which impinge upon specified activities in the atomic energy field, are to the extent that they might interfere with the same, made unenforceable.

The patent provisions of the act are not general changes in the patent laws, but legislation to give the Commission and its licensees and researchers freedom of action in a specified field, i.e., atomic energy.

The normal incentives provided by the patent include the possibility of establishing an enterprise to supply the protected market provided for in the patent grant. In the production of fissionable material, and in the application thereof to a military weapon, no unlicensed private enterprise is permissible.

By terms of the act indemnification in the form of compensation, royalty, or award is substituted for the right to exclude.

In all fields of activity in which the patent laws operate, the normal incentives of the patent are left open, save only in the case of specific patents which impinge upon activities in the field of atomic energy.

The impact of the act upon the patent system, and upon normal process of industry is thus made as small as possible consistent with the needs of common defense and security and the other purposes of the act.

(2) From our observations and discussions with members of the Commission and the Commission staff of the conduct of operations under the act relating to inventions, discoveries, and patent rights we have come to the conclusion that the exercise of rights as practiced by the Commission coincides with our recommendations to disturb the normal conduct of business, particularly in respect to patent rights, as little as possible. While the period of observation has been limited by the relatively short time that the act has been in existence it is evident that the Commission is following, in the fields in which we are interested, the policy of performing the complex and difficult functions with which it is charged by the act with care to avoid any unnecessary interference with normal functioning of the patent system.

(3) The Patent Section, as constituted under OSRD and continued in operation under the Commission, has performed a difficult and intricate service in a manner which merits commendation.

A large number of contracts have been successfully negotiated with all types of contractors involving a great variety of situations in the subject matter, the background position and nature of the contractors, and the character of service to be performed. We find evidence of general satisfaction of the contractors with the work of the contracting officer, and particularly with the fairness with which the contracts have been negotiated and administered.

(4) In the administrative organization we recommend that the Patent Section be established as a section of the Legal Department of the Commission answerable to the General Counsel with wide discretion in patent matters.

(5) The types of patent clauses in contracts employed to meet the different types of subject work, and of the character and situation of the contractors, appear to us to be generally satisfactory. We suggest, in the interest of certainty, an amendment of the definition of the rights of the Government in types B and C (see pp. app. A1–A3 above).

(6) With such exceptions as the act itself makes in the statutory class of inventions and discoveries, the filing of applications for patents on inventions and discoveries under the control of the Commission as previously practiced by the Patent Section should, in the judgment of your committee, be continued subject to security requirements until some equally effective alternative method of protecting the Government against the claim of a later independent inventor is made available by law.

(7) We understand that the formulation of procedures before the Patent Compensation Board and the drafting of regulations for the guidance of applicants seeking to establish claims against the Commission is now engaging the attention of the General Counsel and the Patent Adviser. It is suggested that when the procedures have

been laid out and the regulations have been drafted they be submitted to this panel for such suggestions as its members may be able to contribute.

(8) Claims for substantial sums in the way of compensation, royalty, or award may be imminent, and the establishment of the Board at an early date is desirable. We have suggested a three-man Board from a larger panel. Action of the Board will necessarily be delayed pending the preparation of a set of regulations governing procedure before it.

(9) Consideration should be given to the need for a statute of limitation on claims for awards and compensation. Also consideration should be given to establishing a policy as to the period of use or potential use of an invention or discovery to be covered by an award.

(10) It is recommended that wherever possible attempts be made to negotiate settlements around difficulties rather than to employ the power of declaring patents charged with the public interest, with consequent statutory licenses, or of taking, requisitioning or condemning the needed rights. This is recommended as preferable, both from the standpoint of minimum disturbance of industry and from the standpoint of maintaining security.

(11) Since inventions and discoveries may be made within the field of the act by employees of the Government or of contractors in other departments such as War, Navy, and Air, or even Agriculture or Interior, it is recommended that the Commission request that such departments insert in contracts with employees and with contractors an appropriate provision whereby patent rights in such inventions are allocated in accordance with the practices of the Commission and by which such employees and contractors waive any claims under the act with respect to any invention made in the course of work arising from employment or contract.

(12) The Commission should take steps to publicize the disclosure requirements of section 11(a)(3).

CHAPTER V. CHARTS, STATISTICS, AND INFORMATION ON ATOMIC ENERGY PATENTS

Patent Office Charts

U.S. Department of Commerce,
Patent Office,
Washington, D.C., December 5, 1958.

Mr. John T. Conway,
Acting Executive Director, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D.C.

Dear Mr. Conway: I am transmitting herewith copies of five charts showing trends in the filing of patent applications relating to atomic energy, together with explanations of the respective charts, and a copy of a memorandum of general interest in connection with this matter. These are the charts which were exhibited to Mr. David R. Toll, staff counsel, and Mr. Bernhard Wohlfert on November 17, 1958, at a meeting which took place in the Patent Office, and which you requested in your letter of November 19.

You also requested that copies of any other similar charts, studies or reports be supplied to the Joint Committee. The Patent Office has no additional charts relating to atomic energy studies. A list of all applications for patents on nuclear reactors by persons other than the Atomic Energy Commission, and the status of these applications, is nearing completion by the Patent Office and will be made available to the Joint Committee through the Atomic Energy Commission in accordance with prior arrangements.

It is hoped that the charts and other matters submitted herewith will be helpful in the investigation by your committee.

Sincerely yours,

Arthur W. Crocker,
First Assistant Commissioner.

Office Memorandum, U.S. Government

December 5, 1958.

To: Mr. Arthur W. Crocker, First Assistant Commissioner.
From: Mr. Roger L. Campbell, Acting Examiner, Division 46.
Subject: Copies of charts showing trends in the filing and status of applications of interest in the production or use of atomic energy or special nuclear material.

Herewith is a copy, prepared by the draftsman, of the set of charts which we had prepared for Commissioner Watson's information to show conditions as they appeared on June 30, 1958.

The data shown in these charts represents a breakdown of all applications which have been reported to the Atomic Energy Commission under both the Atomic Energy Act of 1946 and that of 1954. Most of the data shown has been obtained by actual count from the records in this Office, but in the division shown according to private,

U.S. Government, or foreign government assignments, the charts represent an estimate based in part on knowledge by personnel of this Office of the status of inventors and attorneys who originally filed each application. Subsequent assignments have not been considered unless of record when the application was first reported.

In reporting applications, a broad interpretation of the Atomic Energy Acts has been followed as expressed in rule 14(c) of the rules of practice. This has resulted in the reporting of all categories of applications involving inventions which are disclosed to be, or known to be, of some special usefulness in the field of atomic energy. In this respect, the definitions of the acts have been taken at face value. For example, "atomic energy" as used in section 151(c) of the 1954 act is found in section 11(c) to mean "all forms of energy released in the course of nuclear fission or nuclear transformation." Therefore, applications relating to use of gamma radiation or other forms of energy radiated by the spontaneous transformation of naturally radioactive materials have in general been reported. There are exceptions in cases like radium-activated luminous watch dials, as to which there has been agreement between this Office and the Commission that reporting would serve no useful purpose.

Applications for instrumentation, structural materials, recovery, and processing of source materials like uranium, recovery of plutonium and byproducts, and industrial uses of byproducts, have also been included. In other words, the scope of the reporting has gone to a broader area of usefulness in the atomic energy field than the limited category of nuclear reactors and component parts. While accuracy has been sought, the pressure of the regular work of the division has made any extensive rechecking of figures impossible.

ROGER L. CAMPBELL,
Acting Examiner.

CHART I–58–2

This chart shows a tabulation of the number of applications filed in each of calendar years 1934–57 and those reported to AEC in the first half of 1958. The other Government figure is given with some reservation as it is an approximate estimate only.

TREND IN FILING APPLICATIONS OF ATOMIC ENERGY INTEREST, DATA AT CLOSE OF JUNE 11, 1958

The following is a tabulation of data brought up to date from reporting through June 30, 1958:

Year of filing	U.S. Government	Other Government	Private	Total	Year of filing	U.S. Government	Other Government	Private	Total
1930	0	0	1	1	1945	418	3	108	529
1931	0	0	0	0	1946	371	16	103	490
1932	0	0	2	2	1947	207	13	96	316
1933	0	0	0	0	1948	100	25	91	216
1934	0	0	1	1	1949	121	19	88	228
1935	0	0	6	6	1950	101	14	92	207
1936	0	0	4	4	1951	92	22	121	235
1937	0	0	5	5	1952	113	7	135	255
1938	1	0	16	17	1953	97	15	179	291
1939	3	0	17	20	1954	84	19	247	350
1940	0	0	26	26	1955	80	32	338	450
1941	2	0	28	30	1956	114	41	574	729
1942	13	0	42	55	1957	121	85	719	925
1943	44	10	47	101	1958	48	21	279	348
1944	221	16	45	282					

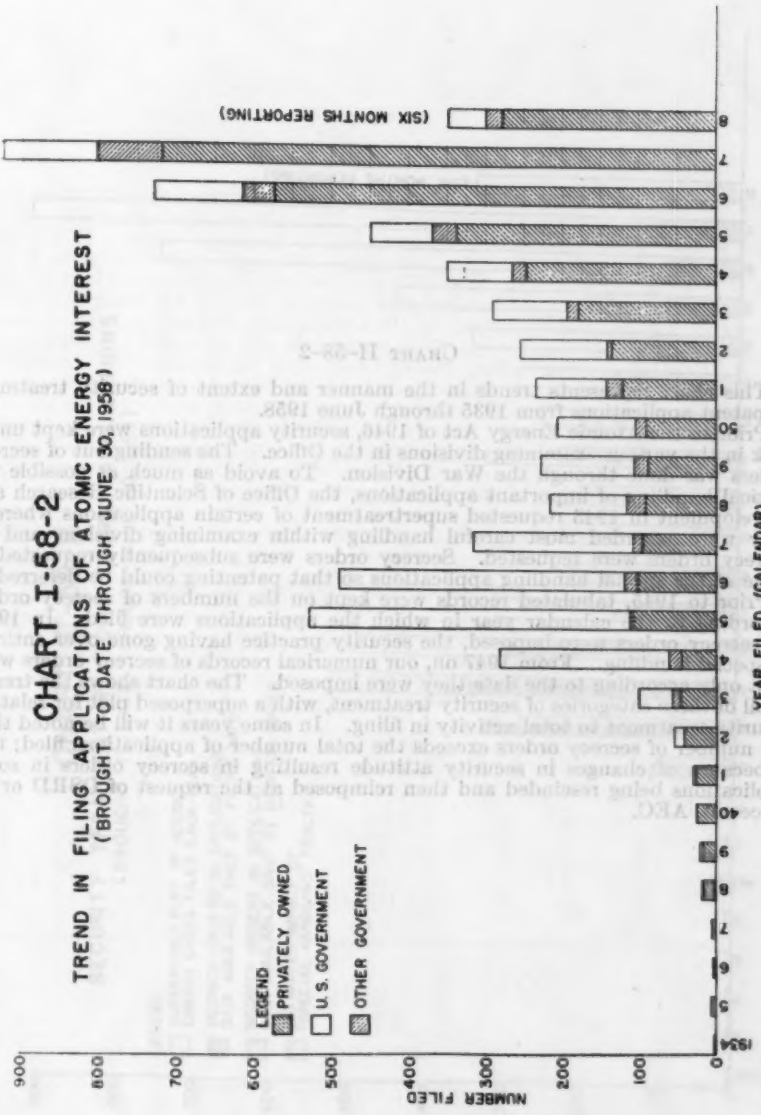


CHART I-58-2
TREND IN FILING APPLICATIONS OF ATOMIC ENERGY INTEREST
(BROUGHT TO DATE THROUGH JUNE 30, 1958)
LEGEND
PRIVATELY OWNED
U. S. GOVERNMENT
OTHER GOVERNMENT
NUMBER FILED
YEAR FILED (CALENDAR)
(SIX MONTHS REPORTING)

CHART II–58–2

This chart represents trends in the manner and extent of security treatment of patent applications from 1935 through June 1958.

Prior to the Atomic Energy Act of 1946, security applications were kept under lock in the various examining divisions in the Office. The sending out of secrecy orders was done through the War Division. To avoid as much as possible the clerical handling of important applications, the Office of Scientific Research and Development in 1943 requested supertreatment of certain applications whereby they were accorded most careful handling within examining divisions and no secrecy orders were requested. Secrecy orders were subsequently requested in some of the special handling applications so that patenting could be deferred.

Prior to 1945, tabulated records were kept on the numbers of secrecy orders according to the calendar year in which the applications were filed. In 1946, no secrecy orders were imposed, the security practice having gone over entirely to special handling. From 1947 on, our numerical records of secrecy orders were kept only according to the date they were imposed. The chart shows the trends in all of these categories of security treatment, with a superposed plot for relating security treatment to total activity in filing. In some years it will be noted that the number of secrecy orders exceeds the total number of applications filed; this is because of changes in security attitude resulting in secrecy orders in some applications being rescinded and then reimposed at the request of OSRD or its successor, AEC.

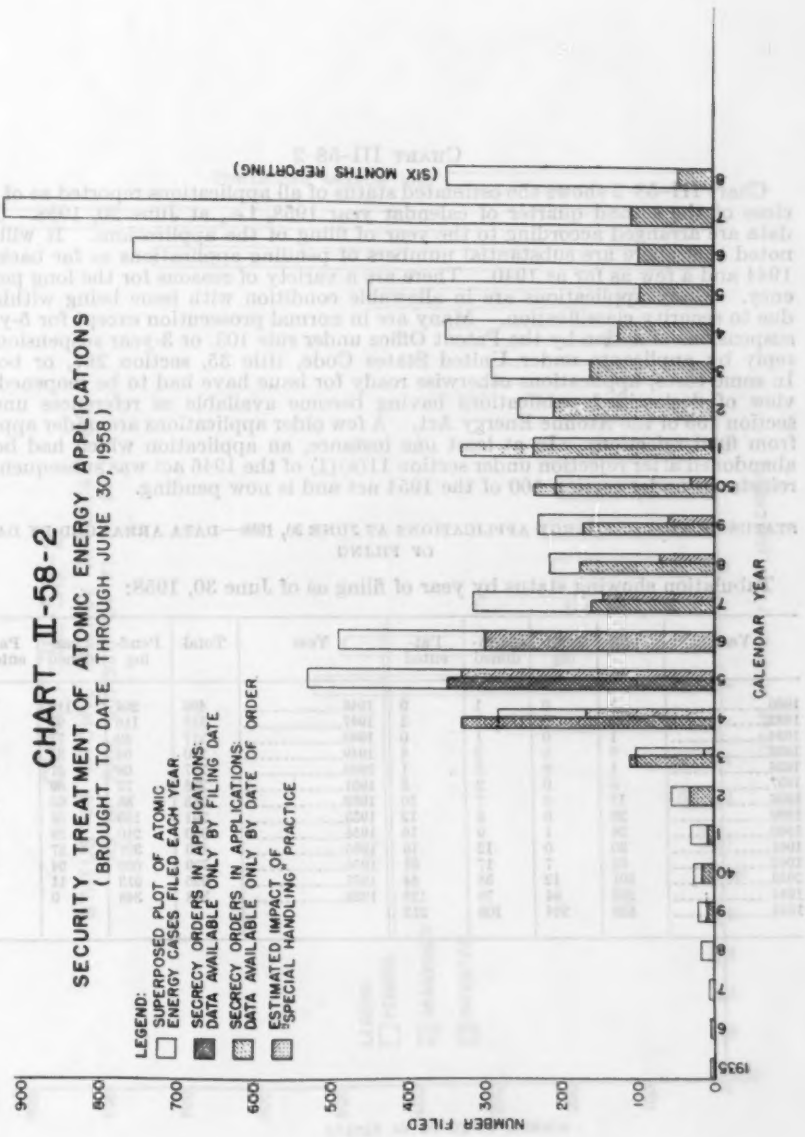


CHART II-58-2
SECURITY TREATMENT OF ATOMIC ENERGY APPLICATIONS
(BROUGHT TO DATE THROUGH JUNE 30, 1958)
LEGEND:
SUPERPOSED PLOT OF ATOMIC ENERGY CASES FILED EACH YEAR
SECRECY ORDERS IN APPLICATIONS: DATA AVAILABLE ONLY BY FILING DATE
SECRECY ORDERS IN APPLICATIONS: DATA AVAILABLE ONLY BY DATE OF ORDER
ESTIMATED IMPACT OF "SPECIAL HANDLING" PRACTICE
NUMBER FILED
CALENDAR YEAR
(SIX MONTHS REPORTING)

Chart III–58–2

Chart III–58–2 shows the estimated status of all applications reported as of the close of the second quarter of calendar year 1958, i.e., at June 30, 1958. The data are arranged according to the year of filing of the applications. It will be noted that there are substantial numbers of pending applications as far back as 1944 and a few as far as 1940. There are a variety of reasons for the long pendency. Many applications are in allowable condition with issue being withheld due to security classification. Many are in normal prosecution except for 5-year suspensions of action by the Patent Office under rule 103, or 3-year suspension of reply by applicants under United States Code, title 35, section 267, or both. In some cases, applications otherwise ready for issue have had to be reopened in view of declassified publications having become available as references under section 155 of the Atomic Energy Act. A few older applications are under appeal from final rejections. In at least one instance, an application which had been abandoned after rejection under section 11(a)(1) of the 1946 act was subsequently reinstated under section 160 of the 1954 act and is now pending.

STATUS OF ATOMIC ENERGY APPLICATIONS AT JUNE 30, 1958—DATA ARRANGED BY DATE OF FILING

Tabulation showing status by year of filing as of June 30, 1958:

Year	Total	Pending	Abandoned	Patented	Year	Total	Pending	Abandoned	Patented
1930	1	0	1	0	1946	490	204	112	174
1932	2	0	1	1	1947	316	116	97	103
1934	1	0	1	0	1948	217	49	71	97
1935	6	0	2	4	1949	230	64	84	82
1936	4	0	3	1	1950	207	68	57	82
1937	5	0	2	3	1951	235	73	69	93
1938	17	0	7	10	1952	255	88	65	102
1939	20	0	8	12	1953	291	153	58	80
1940	26	1	9	16	1954	350	210	59	81
1941	30	0	12	18	1955	450	327	87	36
1942	55	7	17	31	1956	729	650	54	25
1943	101	12	35	54	1957	925	913	11	1
1944	282	84	70	128	1958	348	348	0	0
1945	529	214	103	212					

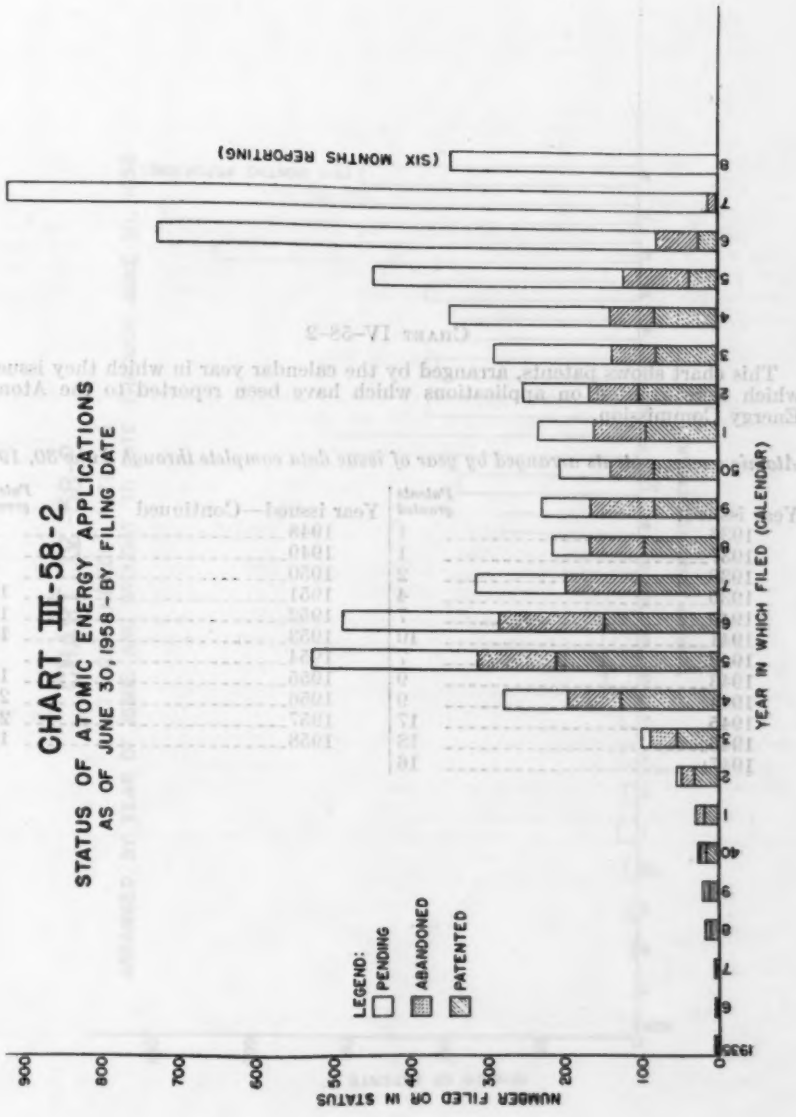


CHART III-58-2
STATUS OF ATOMIC ENERGY APPLICATIONS
AS OF JUNE 30, 1958 - BY FILING DATE
LEGEND:
PENDING
ABANDONED
PATENTED
NUMBER FILED OR IN STATUS
YEAR IN WHICH FILED (CALENDAR)
(SIX MONTHS REPORTING)

CHART IV–58–2

This chart shows patents, arranged by the calendar year in which they issued, which were granted on applications which have been reported to the Atomic Energy Commission.

Atomic energy patents arranged by year of issue data complete through June 30, 1958

Year issued:	Patents granted
1936	1
1937	1
1938	2
1939	4
1940	7
1941	10
1942	7
1943	9
1944	9
1945	17
1946	18
1947	16
1948	38
1949	70
1950	92
1951	157
1952	109
1953	110
1954	95
1955	110
1956	219
1957	246
1958	143

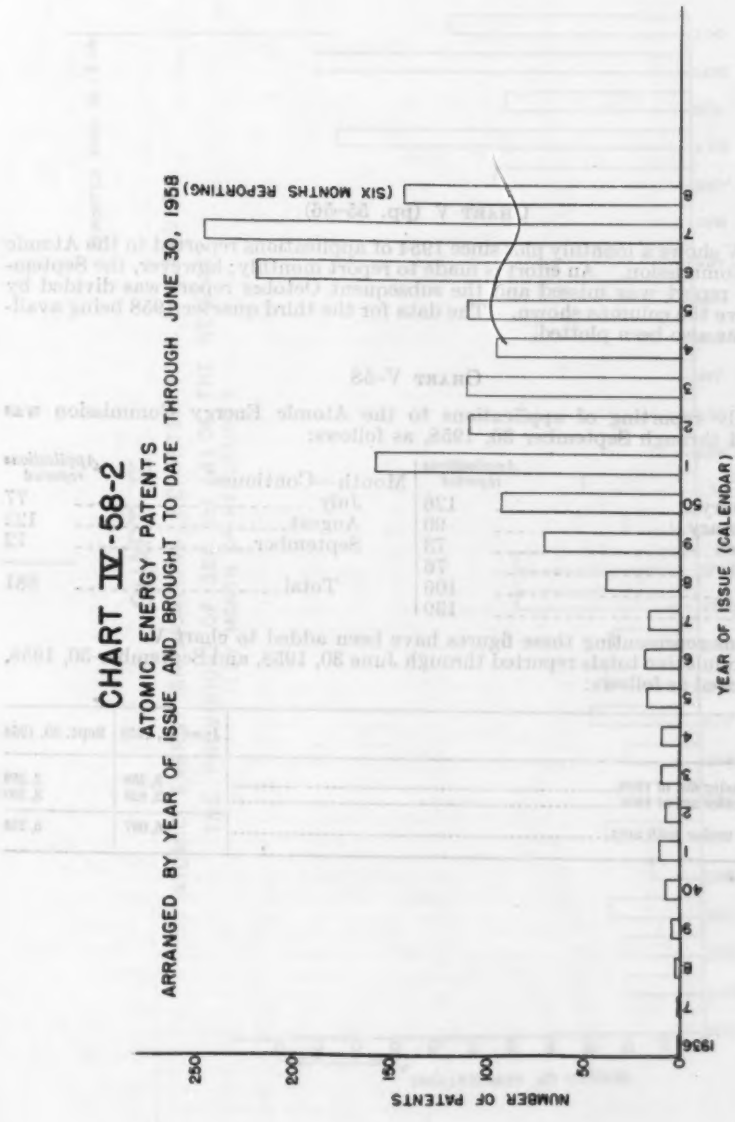


CHART IV-58-2
ATOMIC ENERGY PATENTS
ARRANGED BY YEAR OF ISSUE AND BROUGHT TO DATE THROUGH JUNE 30, 1958
(SIX MONTHS REPORTING)
YEAR OF ISSUE (CALENDAR)
NUMBER OF PATENTS
1936
0
50
100
150
200
250

CHART V (pp. 55–56)

Chart V shows a monthly plot since 1954 of applications reported to the Atomic Energy Commission. An effort is made to report monthly; however, the September 1954 report was missed and the subsequent October report was divided by two to give the columns shown. The data for the third quarter 1958 being available, it has also been plotted.

CHART V–58

Monthly reporting of applications to the Atomic Energy Commission was continued through September 30, 1958, as follows:

Month:	*Applications reported*	Month—Continued	*Applications reported*
January	126	July	77
February	90	August	122
March	73	September	72
April	76		
May	106	Total	881
June	139		

Columns representing these figures have been added to chart V.

The cumulative totals reported through June 30, 1958, and September 30, 1958, are tabulated as follows:

	June 30, 1958	Sept. 30, 1958
Reported under act of 1946	3,258	3,258
Reported under act of 1954	2,829	3,100
Total under both acts	6,087	6,358

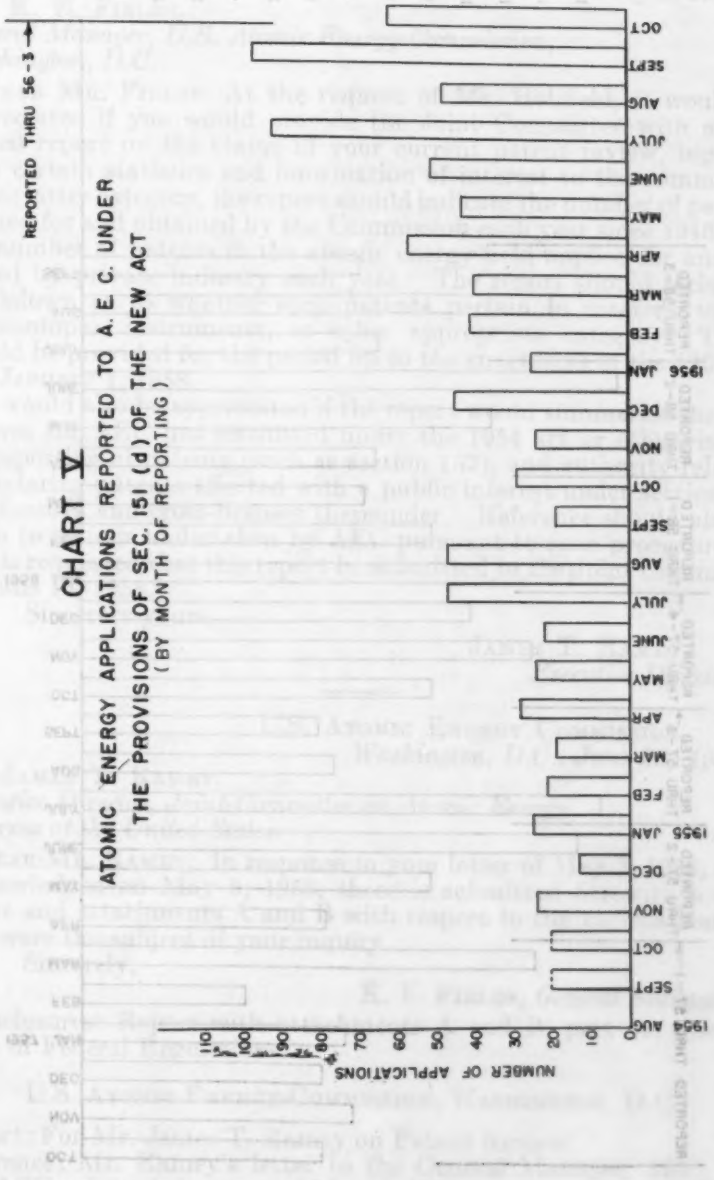
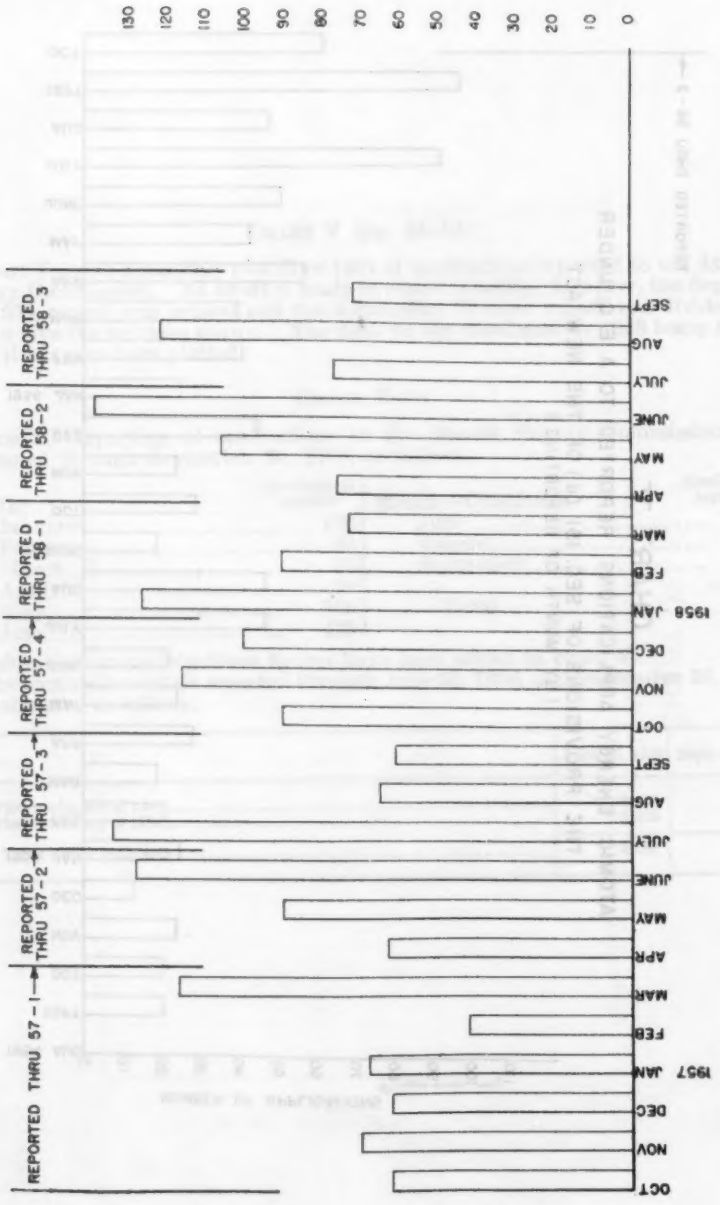


CHART V
ATOMIC ENERGY APPLICATIONS REPORTED TO A. E. C. UNDER
THE PROVISIONS OF SEC. 151 (d) OF THE NEW ACT
(BY MONTH OF REPORTING)
REPORTED THRU 56-3
NUMBER OF APPLICATIONS
0
10
20
30
40
50
60
70
80
90
100
110
1954 AUG
SEPT
OCT
NOV
DEC
1955 JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT
NOV
DEC
1956 JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT


0
10
20
30
40
50
60
70
80
90
100
110
120
130
OCT
NOV
DEC
1957 JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT
NOV
DEC
1958 JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
REPORTED THRU 57-1
REPORTED THRU 57-2
REPORTED THRU 57-3
REPORTED THRU 57-4
REPORTED THRU 58-1
REPORTED THRU 58-2
REPORTED THRU 58-3

AEC Information and Statistics

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
May 2, 1958.

Mr. K. E. FIELDS,
General Manager, U.S. Atomic Energy Commission,
Washington, D.C.

DEAR MR. FIELDS: At the request of Mr. Holifield, it would be appreciated if you would provide the Joint Committee with an informal report on the status of your current patent review, together with certain statistics and information of interest to the committee. In the latter category, the report should indicate the number of patents applied for and obtained by the Commission each year since 1946, and the number of patents in the atomic energy field applied for and obtained by private industry each year. The report should include a breakdown as to whether such patents pertain to reactors, use of radioisotopes, instruments, or other appropriate category. Totals should be provided for the period up to the enactment of the 1954 act and January 1, 1958.

It would also be appreciated if the report would summarize the procedures the AEC has instituted under the 1954 act or otherwise for the reporting of patents (such as section 152), and authority relating to declaring patents affected with a public interest under section 153 and licenses and cross-licenses thereunder. Reference should also be made to actions undertaken by AEC pursuant to such procedures.

It is requested that this report be submitted to the Joint Committee by June 15, 1958.

Sincerely yours,

JAMES T. RAMEY,
Executive Director.

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., June 26, 1958

Mr. JAMES T. RAMEY,
Executive Director, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. RAMEY: In response to your letter of May 2, 1958, duly acknowledged on May 6, 1958, there is submitted herewith a staff report and attachments A and B with respect to the various matters that were the subject of your inquiry.

Sincerely,

K. E. FIELDS, *General Manager.*

Enclosures: Report with attachments A and B, part 81, title 10, Code of Federal Regulations.

U.S. ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.

Report: For Mr. James T. Ramey on Patent Review.
Reference: Mr. Ramey's letter to the General Manager, AEC, and AEC acknowledgement of May 6, 1958.

PATENT REVIEW

The minutes of the April 15 meeting together with certain other data has been submitted to the Patent Advisory Panel. At present

the staff is awaiting the convenience of the panel to discuss certain aspects and tentative meetings have been scheduled with the panel. The staff is preparing summaries of certain data for study and review by the panel and the Commission. Present plans are for the panel to render a report to the Commission in the fall after which the Commission will formulate its position and any recommendations or will request modification in Commission patent policy.

REPORT AS TO PATENT APPLICATIONS AND PATENTS

Pursuant to Mr. Ramey's request, there is submitted as attachment A a listing of the number of patent applications filed by the AEC and private parties from August 1, 1946, to January 1, 1958. Attachment B is a listing of the number of patents issued to the AEC and private parties during the aforesaid period. Both attachments show a breakdown according to the several classes noted in the referenced letter and in addition, have several other pertinent categories. The placement of a patent application or a patent in a particular category is based on the opinion of the classifier.

SUMMARY OF PROCEDURES UNDER THE ATOMIC ENERGY ACT OF 1954

The reporting of patents under section 152 or otherwise is the responsibility of the U.S. Patent Office. When patents are issued the same are published by the U.S. Patent Office, generally within 5 weeks of payment of the final fee after allowance. Until the Atomic Energy Act of 1954, the AEC was not advised by the Patent Office of patents that issued in the atomic energy field but was advised only of applications filed in the area of section 11 of the Atomic Energy Act of 1946 (section 151 of the Atomic Energy Act of 1954). Subsequent to the enactment of section 152 of the 1954 act, the AEC established procedures with the Patent Office for the processing of applications that are otherwise in condition for allowance that were deemed within the provisions of section 152.

The 30-day limitation for an applicant to file a statement as provided in section 152, after Patent Office notification, was found too restrictive. In order to alleviate this time restriction, the AEC suggested to the Commissioner of Patents that an informal notice be issued advising an applicant of the requirement of a statement. This procedure was adopted by the Patent Office and an informal 45-day notice is transmitted to the applicant. If the applicant does not submit a statement within this informal period the Commissioner issues the formal 30-day statutory notice.

Upon notification, the AEC has the statutory 90 days to review an application and ascertain whether a directive should be filed in accordance with said section.

In addition, procedures have been worked out whereby the Commissioner of Patents gives the AEC an informal notice so that if the right in the patent application is vested in the Commission, the Commission may waive further action under section 152 in instances where the Commission rights have been determined in accordance with the provisions of a governing contract.

While in a number of instances the first information that an invention was under a contract has been when the Commissioner of Patents reported the patent application and statement to the AEC, in accord-

ance with section 152, and there have been only two instances where the AEC has filed directives pursuant to said section.

The procedures for declaring a patent affected with the public interest under section 153 and for according licenses in Commission-owned patents, are set forth in part 81, title 10 of the Code of Federal Regulations. The Commission has granted some 718 royalty-free, nonexclusive licenses in addition to licenses accorded contractors pursuant to contracts on Commission-owned patents. The Commission has not initiated any action pursuant to section 153 to declare a patent affected with the public interest, nor has any person embraced within the class of persons enumerated in section 153c initiated any application to the Commission for a patent license pursuant to said section.

Patent applications in atomic energy or related thereto filed by the Atomic Energy Commission or others

[Attachment A]

	Chemistry and metallurgy	Instrument	Isotope separation	Mechanical	Electrical and miscellaneous	Radioisotopes and uses	Reactors	Total (AEC)	Total (others)
From Aug. 1, 1946:									
AEC	34	25	40	13	19	1	13	145	
Others	21		3	1	13		4		42
1947:									
AEC	115	22	45	23	36	19	22	282	
Others	50	1	3	5	23	1	27		110
1948:									
AEC	100	22	28	18	41	2	14	225	
Others	46	3	5	4	29	10	24		121
1949:									
AEC	87	20	26	27	26	3	34	203	
Others	35	9	3	3	27	16	10		101
1950:									
AEC	79	37	26	27	49	1	15	234	
Others	30	10	4	4	33	9	13		103
1951:									
AEC	66	26	24	25	42	1	19	203	
Others	40	17	3	4	43	23	12		142
1952:									
AEC	101	21	21	24	40	2	35	244	
Others	56	13	1	3	28	43	6		140
1953:									
AEC	106	14	21	23	71	5	34	274	
Others	53	24	4	8	24	42	11		166
1954:									
AEC	92	20	3	35	82	4	32	268	
Others	55	37	4	8	42	72	26		244
Subtotal, 1946–54:									
AEC	780	207	234	215	406	38	198	2,078	
Others	386	114	30	38	262	316	133		1,169
1955:									
AEC	66	24	6	48	86	4	31	265	
Others	80	23	11	4	47	112	61		338
1956:									
AEC	69	14	2	42	59	7	60	253	
Others	114	40	10	23	64	197	124		572
1957:									
AEC	91	18	3	32	53	7	56	260	
Others	130	50	23	23	70	182	237		715
Subtotal, 1955–57:									
AEC	226	56	11	122	198	18	147	778	
Others	324	113	44	50	181	491	422		1,625
Total:									
AEC	1,006	263	245	337	604	56	345	2,856	
Others	710	227	74	88	443	807	555		2,794

Patents in atomic energy or related thereto issued to the Atomic Energy Commission or others

[Attachment B]

	Chemistry and metallurgy	Instrument	Isotope separation	Mechanical	Electrical and miscellaneous	Radioisotopes and uses	Reactors	Total (AEC)	Total (others)
From Aug. 1, 1946:									
AEC				1				1	
Others	1	6	1	1	7				16
1947:									
AEC	4	3		4	6	1		18	
Others	7	6	1		5				19
1948:									
AEC	9	7	1	9	13			39	
Others	20	1		4	4				29
1949:									
AEC	16	18		11	15			60	
Others	37				13	1			51
1950:									
AEC	40	31	8	22	30	3		134	
Others	19	2	2	1	7	6			37
1951:									
AEC	73	21	10	25	44	11		184	
Others	33	3	3	2	8	9			58
1952:									
AEC	43	36	11	15	47	3		155	
Others	21	7	7	2	7	2			46
1953:									
AEC	27	22	9	23	35	4		120	
Others	30	5	1	1	12	5			54
1954:									
AEC	36	16	14	25	36	5		132	
Others	11	4	1	2	10	3			31
Subtotal, 1946–54:									
AEC	248	154	53	135	226	27		843	
Others	179	34	16	13	73	26			341
1955:									
AEC	41	14	44	11	39	2	7	158	
Others	6	1	2		6	5			20
1956:									
AEC	126	28	21	27	57	1	19	279	
Others	19	11	1	4	4	15			54
1957:									
AEC	114	21	14	18	62	1	38	268	
Others	15	12	1	5	13	23			69
Subtotal, 1955–57:									
AEC	281	63	79	56	158	4	64	705	
Others	40	24	4	9	23	43			143
Total:									
AEC	529	217	132	191	384	31	64	1,548	
Others	219	58	20	22	96	69			484

[10 CFR 81]

Chapter I. Atomic Energy Commission

STANDARD SPECIFICATIONS FOR THE GRANTING OF PATENT LICENSES

After notice and hearing, the proposed rules published in the Federal Register, 20 F.R. 2283, dated April 8, 1955 entitled "Standard Specifications for the Granting of Patent Licenses," are hereby adopted as follows. The rules are to become effective thirty days after the date of publication. (Effective February 25, 1956.)

GENERAL PROVISIONS

Sec.

81.1 Purpose.
81.2 Definitions.
81.3 Communications.

COMMISSION-OWNED PATENTS

81.10 Contents of Application.
81.11 Basis for Issuance.
81.12 Conditions and Limitations of the License.

PATENTS DECLARED TO BE AFFECTED WITH THE PUBLIC INTEREST

81.20 Contents of Application.
81.21 Basis for Issuance.
81.22 Conditions of the License.

OTHER PATENTS USEFUL IN THE PRODUCTION OR UTILIZATION OF SPECIAL NUCLEAR MATERIAL OR ATOMIC ENERGY

81.30 Scope.
81.31 Contents of Application.
81.32 Basis for Issuance.
81.33 Conditions of the License.

AUTHORITY: § 81.1 to 81.22 issued under Section 153, 68 Stat. 945, 42 U.S.C. 2183, and Section 156, 68 Stat. 947, 42 U.S.C. 2186.

§ 81.1 *Purpose.* The regulations in this part establish the standard specifications for the issuance of licenses on patents owned by the Commission, patents declared to be affected with the public interest pursuant to Section 153a of the Act, and other patents useful in the production or utilization of special nuclear material or atomic energy licensed pursuant to Section 153e of the Act.

§ 81.2 *Definitions.* As used in this part:

(a) "Act" means the Atomic Energy Act of 1954 (68 Stat. 919), including any amendments thereto;

(b) "Commission" means the Atomic Energy Commission or its duly authorized representatives.

§ 81.3 *Communications.* All communications concerning the regulations in this part, including applications for licenses, should be addressed to the United States Atomic Energy Commission, 1901 Constitution Avenue NW., Washington 25, D.C., Attention: Chief, Patent Branch.

§ 81.4 *Interpretations.* Except as specifically authorized by the Commission in writing, no interpretation of the meaning of the regulations in this part by any officer or employee of the Commission other than a written interpretation by the General Counsel will be recognized to be binding upon the Commission.

COMMISSION-OWNED PATENTS

§ 81.10 *Contents of application.* Each application shall contain the name and address of the applicant and the State of incorporation if applicant is a corporation.

§ 81.11 *Basis for issuances.* The Commission will issue the license upon receipt of an application containing the required contents.

§ 81.12 *Conditions and limitations of the license.* Each license shall contain and be subject to the following conditions and limitations:

(a) The license shall be non-exclusive, revocable, and royalty-free;

(b) Neither the license nor any right under the license shall be assigned or otherwise transferred;

(c) The license shall not constitute a license or authorization under any provision of the Act other than section 156 of the Act.

(d) The Commission makes no representation or warranty that the exercise of the license will not result in infringement of any other patent, nor does the Commission assume any liability resulting from the exercise of the license.

(e) The licensee shall be subject to, and the licensee shall observe all applicable rules, regulations and orders of the Commission.

PATENTS DECLARED TO BE AFFECTED WITH THE PUBLIC INTEREST

§ 81.20 *Contents of application.* Each application shall contain the following information:

(a) The name and address of the applicant;

(b) The State of incorporation, if the applicant is a corporation;

(c) The activities in the production or utilization of special nuclear material or atomic energy to which applicant proposes to apply the license;

(d) The relationship of the invention or discovery to the activities to which it is to be applied, including an estimate of the effect on such activities stemming from the grant or denial of the license;

(e) The nature and purpose of the use which the applicant intends to make of the patent license;

(f) Efforts made by applicant to obtain a patent license from the owner of the patent;

(g) Terms, if any, on which the owner of the patent proposed to grant applicant a patent license.

§ 81.21 *Basis for issuance.* The Commission will issue a patent license for patents declared by the Commission to be affected with the public interest pursuant to section 153 of the Act upon a finding that:

(a) The activities to which the patent license is proposed to be applied by the applicant are of primary importance to the conduct of an activity by such applicant authorized under the Act.

(b) The applicant cannot otherwise obtain a patent license from the owner of the patent on terms which are reasonable for the intended use to be made of the patent by the applicant.

§ 81.22 *Conditions of the license.* Each license shall contain and be subject to the following conditions:

(a) The license shall be non-exclusive and revocable;

(b) Neither the license nor any right under the license shall be assigned or otherwise transferred;

(c) The licensee shall pay a reasonable royalty fee. Such royalty fee may be agreed upon between the owner and such patent licensee, or in the absence of such agreement shall be determined for each patent license by the Commission pursuant to section 157 of the Act;

(d) The licensee shall be subject to and the licensee shall observe all applicable rules, regulations, and orders of the Commission.

OTHER PATENTS USEFUL IN THE PRODUCTION OR UTILIZATION OF SPECIAL NUCLEAR MATERIAL OR ATOMIC ENERGY

§ 81.30 *Scope.* Any person—

(a) Who has made application to the Commission for a license under sections 53, 62, 63, 81, 103, or 104, or a permit or lease under section 67;

(b) To whom such license, permit, or lease has been issued by the Commission;

(c) Who is authorized to conduct such activities as such applicant is conducting or proposes to conduct under a general license issued by the Commission under section 62 or 81; or

(d) Whose activities or proposed activities are authorized under section 31,

may at any time make application to the Commission for a patent license for the use of an invention or discovery useful in the production or utilization of special nuclear material or atomic energy covered by a patent.

§ 81.31 *Contents of application.* Each application shall contain the following information:

(a) The name, and address of the applicant;

(b) The State of incorporation, if the applicant is a corporation;

(c) The activities in the production or utilization of special nuclear material or atomic energy to which applicant proposes to apply the license;

(d) The relationship of the invention or discovery to the activities to which it is to be applied, including an estimate of the effect on such activities stemming from the grant or denial of the license;

(e) The nature and purpose of the use which the applicant intends to make of the patent license;

(f) Efforts made by applicant to obtain a patent license from the owner of the patent;

(g) Terms, if any, on which the owner of the patent proposed to grant applicant a patent license.

§ 81.32 *Basis for issuance.* The Commission will issue the patent license upon a finding that:

(a) The invention or discovery covered by the patent is of primary importance in the production or utilization of special nuclear material or atomic energy;

(b) The licensing of such invention or discovery is of primary importance to the conduct of the activities of the applicant;

(c) The activities to which the patent license is proposed to be applied by such applicant are of primary importance to the furtherance of policies and purposes of the Act; and

(d) Such applicant cannot otherwise obtain a patent license from the owner of the patent on terms which the Commission deems to be reasonable for the intended use of the patent to be made by such applicant.

§ 81.33 *Conditions of the license.* Each license shall contain and be subject to the following conditions:

(a) The license shall be non-exclusive and revocable;

(b) Neither the license nor any right under the license shall be assigned or otherwise transferred;

(c) The license shall be limited to the purposes for which it is issued;

(d) The licensee shall pay a reasonable royalty fee. Such royalty fee may be agreed upon between the owner and such patent licensee, or in the absence of such agreement shall be determined for each patent license by the Commission pursuant to section 157 of the act;

(e) The licensee shall be subject to and the licensee shall observe all applicable rules, regulations, and orders of the Commission.

U.S. ATOMIC ENERGY COMMISSION,
Washington D.C., November 5, 1958.

MR. DAVID TOLL,
Counsel, Joint Committee on Atomic Energy,
Congress of the United States,
Washington, D.C.

DEAR MR. TOLL: At one of the informal meetings with Mr. Ramey and yourself, you requested information as to studies undertaken of the Government's patent policies. While some very early studies, prior to 1930, might be of some interest the first comparatively recent study was that undertaken by the National Patent Planning Commission pursuant to Executive Order 89776 of December 12, 1941. One of the conclusions set forth in the second report reads:

"The Commission believes, however, that, since the Government has no need of the right to exclude conferred by a patent and does not enter into ordinary commercial enterprises in competition with its citizens, full ownership of patents should not ordinarily be asserted by the Government. An exception to this policy would be the situation in which private ownership of the patents would conflict with national interest. In those cases in which the Government does not acquire ownership of the patents, it should ordinarily receive as a minimum a royalty-free license. All negotiations in connection with research and development contracts, as well as the drafting of the contracts themselves, should be performed as now, by the agencies involved."

President Roosevelt in late 1943 instructed the Attorney General to investigate the Government patent policies and practices and make overall recommendations as to a Government policy. The Attorney General's analysis and recommendations are contained in a 1947 report in three volumes entitled "Investigations of the Government Patent Policy and Recommendations of the Attorney General to the President." Among the recommendations of the Attorney General which caused considerable concern was the recommendation in volume 1, page 5, which stated:

"As a basic policy, all contracts for research and development work financed with Federal funds should contain a stipulation providing that the Government shall be entitled to all rights to inventions produced in the performance of the contract."

One of the monographs in volume 3, page 167, is entitled "Monograph on Prior Studies and Legislative Proposals." This reviews the various studies from 1887 to 1947. One of the monographs in volume 2, page 325, discusses the policy of the Office of Scientific Research and Development. The "short form" patent clause discussed therein was the same basic clause used on the Manhattan project which has formed the cornerstone for the Commission policy.

A later Attorney General's report of December 7, 1950, rendered under section 708e of the Defense Production Act of 1950 briefly reviewed the Government patent policy (pp. 15–17, 37) and in referring to the 1947 report quoted therefrom as follows:

"Where patentable inventions are made in the course of performing a Government-financed contract for research and development, the public interest requires that all rights to such inventions be assigned to the Government and not left to the private ownership of the

contractor. Public control will assure free and equal availability of the inventions to American industry and science; will eliminate any competitive advantage to the contractor chosen to perform the research work, will avoid undue concentration of economic power in the hands of a few large corporations; will tend to increase and diversify available research facilities within the United States to the advantage of the Government and of the national economy; and will thus strengthen our American system of free, competitive enterprise."

In the Attorney General's report under 708e submitted November 9, 1956, the Attorney General again made reference to the Government patent policies (pp. 48–53). The report after summarizing the 1947 Attorney General's report concluded the patent review with the following statement:

"If such further analysis demonstrates a strong tendency toward concentration, then it would seem that the vital interest of this Government in maintaining a freely competitive economy would add a strong argument in favor of Government acquisition of patents. Of course, any such patents held by the Government should continue, within necessary security limitations, to be available under nonexclusive licenses to all applicants, including the contractor who performed the research and development work."

We trust that this brief summary of some of the highlights of more recent general patent studies and reports with the monograph of prior studies will be of assistance in your review.

A comprehensive review of the Atomic Energy patent program, aside from references to the same in the Attorney General's report of 1947, is the report of the Commission's Patent Advisory Panel, dated September 17, 1947, a copy of which is attached hereto.

You are, of course, aware of the current study of the Subcommittee on Patents, Trademarks and Copyrights, Committee on the Judiciary, chairmanned by the Honorable Senator Joseph C. O'Mahoney.

Sincerely yours,

ROLAND A. ANDERSON,
Chief, Patent Branch.

Enclosure: Report of Patent Advisory Panel.

NOVEMBER 7, 1958.

Mr. JOHN A. MCCONE,
Chairman, U.S. Atomic Energy Commission,
Washington, D.C.

DEAR MR. MCCONE: In connection with the Joint Committee study of atomic energy patent policies and procedures, and the operation of chapter 13 of the Atomic Energy Act of 1954 pertaining to patents and inventions, it is requested that the Commission forward to the committee certain reports as listed in the enclosure. It is requested that as much as possible of this material (especially items 1 through 8) be submitted on or before December 1, 1958, with the remainder being submitted as soon thereafter as possible.

In addition, the Joint Committee would appreciate receiving any available copies of any other statistics or reports which the Commission staff might prepare in connection with the Commission's own review of the patent program.

The cooperation of the Commission in response to this request is appreciated.

I am also enclosing, for your information, a copy of my letter of this date to Mr. Robert C. Watson, Commissioner of Patents.

Sincerely yours,

CARL T. DURHAM, *Chairman.*

REPORTS ON PATENT POLICIES AND PROCEDURES REQUESTED FROM AEC

1. Sample contract clauses A, B, and C. Statistics as to number of contracts using each type.
2. List of Commission patents on which licenses have been granted, and number granted in each case.
3. List of Commission patents on various reactor types including: A. Pressurized water: B. Boiling water; C. Organic moderated; D. Sodium-cooled; E. Homogeneous; F. Fast breeder; G. Gas-cooled; H. Other.
4. List of applications by AEC as to each above reactor type.
5. List of applications by persons other than AEC in which Commission has claimed ownership under section 152, either through negotiations with the applicant or by direction to the Patent Office.
6. List of all reactor applications received by the Patent Office under section 152, indicating in each case: the date of the application; the name of the applicant (and any assignees of record); the date that AEC was notified under section 151; the date AEC was notified under section 152; the title of the invention; the status of the application; and any pertinent remarks.
7. List of foreign patents applications filed by AEC. (600)
8. List of awards granted under section 157.
9. Brief summary of organization, personnel, and functions of Patent Branch of AEC General Counsel's Office, both headquarters and field offices.
10. Brief summaryof procedures followed by AEC in requiring reports by contractors as to inventions of their employees.

REPORT ON THE PATENT POLICIES AND PROCEDURES OF THE ATOMIC ENERGY COMMISSION REQUESTED BY HON. CARL T. DURHAM, CHAIRMAN, JOINT COMMITTEE ON ATOMIC ENERGY IN THE QUESTIONNAIRE ATTACHED TO HIS LETTER OF NOVEMBER 7, 1958

Question 1. "Sample contract clauses A, B, and C, statistics as to number of contracts using each type."

Answer 1. The following are the three types of patent clauses:

Type A.—"1. Whenever any invention or discovery is made or conceived by the contractor or its employees in the course of, in connection with, or under the terms of this contract, the contractor shall furnish the Commission with complete information thereon; and the Commission shall have the sole power to determine whether or not and where a patent application shall be filed, and to determine the disposition of the title to and the rights under any application or patent

that may result. The judgment of the Commission on these matters shall be accepted as final; and the contractor, for itself and for its employees, agrees that the inventor or inventors will execute all documents and do all things necessary or proper to carry out the judgment of the Commission."

Type B.—"1. Whenever any invention or discovery is made or conceived by the contractor or its employees in the course of, in connection with, or under the terms of this contract, the contractor shall furnish the Commission with complete information thereon; and the Commission shall have the sole power to determine whether or not and where a patent application shall be filed; and to determine the dispostion of the title to and the rights under any application or patent that may result: *Provided, however,* That the contractor, in any event, shall retain at least a nonexclusive, irrevocable, royalty-free license under said invention, discovery, application or patent, such license being limited to the manufacture, use, and sale for purposes other than use in tbe production or utilization of special nuclear material or atomic energy. Subject to the license retained by the contractor, as provided in this paragraph, the judgment of the Commission on these matters shall be accepted as final; and the contractor, for itself and for its employees, agrees that the inventor or inventors will execute all documents and do all things necessary or proper to carry out the judgment of the Commission."

Type C.—"1. Whenever any invention or discovery is made or conceived by the contractor or its employees in the course of, in connection with, or under the terms of this contract, the contractor shall furnish the Commission with complete information thereon; and the Commission shall have the sole power to determine whether or not and where a patent application shall be filed, and to determine the disposition of the title to and the rights under any application or patent that may result: *Provided, however,* That the contractor in any event, shall retain at least a sole (except as against the Government or its account), irrevocable, royalty-free license with the sole right to grant sublicenses, under said invention, discovery, application or patent, such license being limited to the manufacture, use, and sale for purposes other than use in the production or utilization of special nuclear material or atomic energy. Subject to the license retained by the contractor, as provided in this paragraph, the judgment of the Commission on these matters shall be accepted as final; and the contractor, for itself and for its employees, agrees that the inventor or inventors will execute all documents and do all things necessary or proper to carry out the judgment of the Commission."

In addition to one of the foregoing types of patent clauses, the patent article of contracts also includes the following provisions:

"2. No claim for pecuniary award or compensation under the provisions of the Atomic Energy Acts of 1946 and 1954 shall be asserted by the contractor or its employees with respect to any invention or discovery made or conceived in the course of, in connection with, or under the terms of this contract.

"3. Except as otherwise authorized in writing by the Commission, the contractor will obtain patent agreements to effectuate the purposes of paragraphs 1 and 2 of this article from all persons who perform any part of the work under this contract, except such clerical and manual labor personnel as will not have access to technical data.

"4. Except as otherwise authorized in writing by the Commission, the contractor will insert in all subcontracts provisions making this article applicable to the subcontractor and its employees."

In instances where contractors desire to file patent applications, the following proviso is inserted after "result" in line 9 of the type A, B, or C clause: "*Provided, however,* That if the contractor when furnishing the complete information as to any invention or discovery advises the Commission that the contractor desires to file a patent application and sets forth the date when such patent application will be filed, the contractor may file any United States or foreign patent application on such invention, subject to Commission security requirements and regulations."

STATISTICS AS TO THE NUMBER OF CONTRACTS EMPLOYING A, B OR C PATENT CLAUSES

The following is a breakdown of the number of prime contracts and subcontracts between January 1, 1946, and October 31, 1958, that have been reported to the Patent Branch of the Commission as employing type A, B or C patent provisions, listed according to the year in which the contracts originated. There is also shown on the list the number that are still active according to Patent Branch records.

Patent article	Prime contracts						Subcontracts					
	A		B		C		A		B		C	
	Number	Still active	Number	Still active	Number	Still active	Number	Still active	Number	Still active	Number	Still active
1946	35	5	2	0	1	0	53	1	6	0	0	0
1947	47	3	7	0	7	0	127	3	0	0	3	0
1948	120	5	42	1	23	0	324	8	10	0	6	0
1949	192	28	26	1	15	1	254	7	12	0	7	0
1950	233	77	22	4	10	1	492	25	20	0	19	0
1951	206	64	19	1	10	1	482	40	45	3	33	0
1952	205	45	18	7	15	3	427	33	28	0	16	1
1953	158	57	7	1	6	1	722	46	30	0	22	0
1954	159	88	8	2	6	1	371	46	18	2	29	4
1955	174	106	8	6	8	4	499	87	27	2	36	10
1956	234	177	14	7	24	22	501	117	38	11	73	30
1957	243	203	6	6	10	9	508	250	32	19	48	27
1958	242	230	3	3	15	15	393	329	8	8	32	30
Total contracts	2,248	------	182	------	150	------	5,153	------	274	------	324	------
Total still active	------	1,088	------	39	------	58	------	992	------	45	------	102

Question 2. List of Commission patents on which licenses have been granted, and number granted in each case.

Answer 2. The listing in addition to the patents and the number of licensees also includes the name of the licensees and the type of license as well as the date granted. This latter information was requested by the Subcommittee on Patents and the preparation of one list was prepared to comply with both requests.

The list shows the number of the patent, the title of the patents, the names of the inventors, the name of the licensee and address, and date license was issued.

Schedule A is a list of the presently owned Commission patents on which nonexclusive, revocable, royalty-free licenses in all fields have been accorded to the licensee upon written request.

Schedule B is a list of the presently owned Commission patents on which contractors retained one or more types of license pursuant to the terms of the contract or upon request at the time of the execution of the assignment of the title to the Commission. This schedule has an additional column in which the type of license is identified. The type of licenses are identified as:

Type B: The license retained is a nonexclusive, irrevocable, royalty-free license sometimes for all purposes, sometimes for atomic energy purposes only, some may include the right to grant sublicenses in specific fields, and in others, as is the case of the United Kingdom and Canadian Governments' licenses, they are a nonexclusive license for governmental and mutual defense purposes pursuant to the terms of the Tripartite Agreement of September 1956.

Type C: The license retained is a sole license, with the sole right to grant sublicenses for specific nonatomic energy purposes or for purposes other than use in the production or utilization of special nuclear material or atomic energy. The license may also include a nonexclusive license for other purposes.

SCHEDULE A

List of presently owned Commission patents on which nonexclusive royalty-free licenses in all fields have been granted to the licensee upon request

Patent No.	Subject matter	Inventors	Contractor and address	Date of license
2,417,392	Optical system for reading torsion	R. Q. Boyer, R. Craig	Microchemical Specialties Co., Berkeley, Calif.	Jan. 11, 1950
2,419,915	Apparatus for storage of fluorine	Priest & Grosse	Scientific Service, Inc., Berkeley, Calif.	Apr. 9, 1952
			Pennsylvania Salt Manufacturing Co., Wyndmoor, Pa.	Mar. 21, 1955
2,522,590	Production of fluorine	W. C. Schumb & A. J. Stevens	Hooker Electrochemical Co., Niagara Falls, N.Y.	Nov. 15, 1951
2,423,173	Safety pipette	Brady & Glendenin	Scientific Service, Inc., Albany, Calif.	Apr. 9, 1952
2,431,969	Fluorination of perchlorohexatriene	W. S. Struve	Merrill J. Ainsworth, Northridge, Calif.	May 12, 1952
2,436,083	Sedimentation tube	Williams & Bevilacqua	Scientific Service, Inc., Albany, Calif.	Apr. 9, 1952
2,436,084	Ionization chamber	Weller	do	Do.
2,440,167	Differential ion chamber	Broxon & Jesse	do	Do.
2,440,999	Compressed neutron source	H. L. Anderson	Radium Chemical Co., Inc., New York, N.Y.	May 17, 1950
			Kaman Aircraft Corp., Albuquerque, N. Mex.	Dec. 4, 1957
2,442,314	Geiger counter improvement	A. F. Reid	N. Wood Counter Laboratory, Chicago, Ill.	Jan. 25, 1950
2,442,622	Seal	Starr	Scientific Service Co., Albany, Calif.	Apr. 9, 1952
2,442,599	Glass magnetic stopcock	Herrick & Liberatore	do	Do.
			Sunrise Products Co.	July 11, 1952
ViTron			Vi Tron Co., San Diego, Calif.	Apr. 13, 1954
2,442,625	Packless valve	J. B. Thomas	Shell Oil Co., Houston, Tex.	Sept. 19, 1951
2,443,365	Support for Geiger-Mueller counter	E. H. Wakefield	Scientific Service, Inc., Albany, Calif.	Apr. 9, 1952
2,446,780	Method of preparing uranium hydride	Amos S. Newton	American Potash & Chemical, Los Angeles, Calif.	Jan. 18, 1957
2,452,156	Float position indicator	Donald S. Schover	Shell Oil Co., Houston, Tex.	Sept. 19, 1951
2,452,913	Method of producing calcium hydrides	Dick Duffey	American Potash & Chemical, Los Angeles, Calif.	Jan. 18, 1957
2,456,426	A mass spectrometer	A. O. C. Nier, E. P. Ney	Beckman Instruments, Inc., South Pasadena, Calif.	Feb. 17, 1955
2,458,632	Ionization chamber	J. H. Parsons	Canadian Radium & Radium Corp., New York, N.Y.	Mar. 31, 1950
			P. J. McNamara, Borman, N. Dak.	Dec. 19, 1950
			Scientific Service, Inc., Albany, Calif.	Apr. 9, 1952
			Jerry W. Walker, Memphis, Tenn.	Apr. 22, 1955
2,461,661	Preparation of alkali metal compounds	H. I. Schlesinger, H. C. Brown	Metal Hydrides, Inc., Beverly, Calif.	Jan. 10, 1950
			Allied Process Corp., New York, N.Y.	Oct. 3, 1950
			Michigan Chemical Corp., St. Louis, Mich.	Apr. 19, 1956
			American Potash & Chemical, Los Angeles, Calif.	Jan. 18, 1957
			Callery Chemical Co.	May 28, 1957
2,461,662	do	do	Same as for 2,461,661	(1)
2,461,663	Preparation of alkali metal borohydrides	do	do	(1)
2,462,935	A high stability voltage regulator	Wm. R. Baker	Beva Laboratory, Trenton, N.J.	Oct. 10, 1950
			Jerry W. Walker, Memphis, Tenn.	Apr. 22, 1955
2,462,997	Attachment for milling machine	James L. Roush	Hamden Machine Products, New Haven, Conn.	Dec. 7, 1953
2,465,886	Electrical measuring apparatus	O. G. Landsverk, E. O. Wollan	Tracerlab, Inc., Boston, Mass.	Mar. 8, 1950
2,465,938	Radiation measuring device	F. R. Shonka	Canadian Radium & Uranium Corp., New York, N.Y.	Mar. 31, 1950
			Jerry W. Walker, Memphis, Tenn.	Apr. 20, 1955
2,470,895	Impulse-type power supply	E. W. Marlowe, H. A. Wilcox	Kaman Aircraft Corp., Albuquerque, N. Mex.	Dec. 4, 1957
2,472,365	Alpha particle counting	C. J. Borkowski	Canadian Radium & Uranium Corp., New York, N.Y.	Mar. 31, 1950
			P. J. McNamara, Borman, N. Dak.	Dec. 19, 1950

2,474,773	Radiation detector	Wm. R. Baker	Canadian Radium & Uranium Corp., New York, N.Y.	Mar. 31, 1950
2,475,138	Device for measuring thermal conductivity	C. B. Hood, W. Jones, H. L. Johnston	John B. Pierce Foundation, Raritan, N.J.	Jan. 10, 1950
2,476,249	Remote control manipulator	J. H. Payne	Scientific Service, Inc., Albany, Calif.	Apr. 9, 1952
			Borg-Warner Corp., Chicago, Ill.	Aug. 15, 1956
2,476,490	The production of trifluoro acetic acid	Maurice Stacey, United Kingdom Government.	The Beacon Co., Cambridge, Mass.	June 2, 1958
2,479,271	Ionization chamber circuit	F. R. Shonka	Canadian Radium & Uranium Corp., New York, N.Y.	Mar. 31, 1950
			Scientific Service, Inc., Albany, Calif.	Apr. 9, 1952
			Jerry Walker, Memphis, Tenn.	Apr. 22, 1955
2,479,600	Ionization chamber	C. J. Borkowski	Canadian Radium & Uranium Corp., New York, N.Y.	Mar. 31, 1950
			Scientific Service Inc., Albany, Calif.	Apr. 9, 1952
2,479,669	Apparatus for magnetic measurements	W. M. Powell	Albany, Calif.	Do.
			Southern Minerals Inc., Haymarket, Va.	Sept. 22, 1953
2,480,467	Production of trifluoracetic acid compounds	W. N. Haworth, Maurice Stacey, United Kingdom Government.	The Beacon Co., Cambridge, Mass.	June 2, 1958
2,481,320	Magnetic pump	S. L. Madorsky	Shell Oil Co., Houston, Tex.	Sept. 19, 1951
2,481,506	Fast neutron meter	C. C. Gamertsfelder, Jr.	Canadian Radium & Uranium Corp., New York, N.Y.	Mar. 31, 1950
2,481,964	do	E. O. Wollan	do	Do.
2,483,981	Dynamic condenser	H. Palevsky, R. K. Swank	Applied Physics Corp., Pasadena, Calif.; Consolidated Engineering Corp.	Jan. 11, 1950
			Minneapolis-Honeywell Co., Philadelphia, Pa.	Apr. 19, 1950
			National Technical Laboratory, South Pasadena, Calif.	May 17, 1950
			Beva Laboratory, Trenton, N. J.	Oct. 10, 1950
			Industrial Nucleonics Corp., Columbus, Ohio.	Dec. 12, 1950
			Shell Oil Co., Houston, Tex.	Sept. 19, 1951
2,483,991	Radiation exposure meters	E. O. Wollan, L. A. Pardue, N. Goldstein.	Tracerlab, Inc., Boston, Mass.	Mar. 8, 1950
			Vemaline Products Co., Hawthorne, N. J.	Oct. 22, 1953
2,485,469	Method and means for detecting ionization	Allen & Rossi	Charlie C. Peterson, Gladwin, Mich.	June 8, 1955
2,486,207	Liquid level measuring apparatus	M. K. Richards	Scientific Service, Inc., Albany, Calif.	Apr. 9, 1952
2,485,207	do	do	Albany, Calif.	Do.
2,486,976	Pressure measuring device	Wm. R. Perret	Sunrise Products Co., Hawthorne, N.J.	July 11, 1952
2,487,510	Current integrating network	Wm. R. Baker	Beva Laboratory, Trenton, N.J.	Oct. 19, 1950
			Trenton, N.J.	Do.
			Shell Oil Co., Houston, Tex.	Sept. 19, 1951
2,489,028	Positive shutoff dispensing	Calver & Graham	Scientific Service, Inc., Albany, Calif.	Apr. 9, 1952
2,490,298	Radiation detecting apparatus	A. Ghiorso & C. M. Gordon	Charlie C. Peterson, Gladwin, Mich.	June 8, 1955
2,491,320	Neutron detectors	P. H. Koontz	P. J. McNamara, Borman, N. Dak.	Dec. 19, 1950
2,492,365	Dispensing nozzle	O. E. Miller	Scientific Services, Inc., Albany, Calif.	Apr. 9, 1952
2,493,137	Voltage doubling circuit	Wm. W. Hansen	Beva Laboratory, Trenton, N.J.	Oct. 19, 1950
			Campbell X-Ray Corp., Boston, Mass.	Aug. 27, 1953
			Kaman Aircraft Corp., Albuquerque, N. Mex.	Dec. 4, 1957
2,494,267	Surface hardening of ferrous metal	H. I. Schlesinger, G. W. Schaeffer	Radiation Counter Laboratory, Chicago, Ill.	Mar. 6, 1950
			American Potash & Chemical, Los Angeles, Calif.	Jan. 18, 1957
2,494,641	Radiation counter	H. L. Anderson, P. G. Koontz	Wm. F. Klemp Co., Chicago, Ill.	Aug. 29, 1950
2,494,968	Alkali borohydrides and methods	H. I. Schlesinger, H. C. Brown	Allied Process Corp., New York, N.Y.	Oct. 3, 1950
			Metal Hydrides, Inc., Beverly, Mass.	Apr. 5, 1950
			American Potash & Chemical, Los Angeles, Calif.	Jan. 18, 1957
			Callery Chemical Co., Callery, Pa.	May 28, 1957
2,499,288	Vacuum analyzer	J. G. Backus	Beckman Instruments Inc., South Pasadena, Calif.	Feb. 17, 1955
2,499,289	Ion generator	do	do	Do.
			Jerry W. Walker, Memphis, Tenn.	Apr. 22, 1955

[1] Same as for 2,461,661.

SCHEDULE A—Continued

List of presently owned Commission patents on which nonexclusive royalty-free licenses in all fields have been granted to the licensee upon request—Continued

Patent No.	Subject matter	Inventor	Contractor and address	Date of license
2,499,320	Ion generator	R. Loevinger	Beckman Instruments Inc., South Pasadena, Calif	Feb. 17, 1955
2,499,830	Air proportional counter	E. W. Molloy	P. J. McNamara, Borman, N. Dak	Dec. 19, 1950
2,499,839	High-speed mercury diffusion pump	G. R. Stoltenberg	VITron Co., San Diego, Calif	Apr. 13, 1954
2,500,492	Apparatus for handling materials	F. C. Henriques, Jr	Scientific Service Inc., Albany, Calif	Apr. 9, 1952
2,500,755	Rectangular pulse amplifier	Q. A. Kerns	Beva Laboratory, Trenton, N.J	Oct. 19, 1950
2,502,074	Pumping corrosive mediums	Hubble & Brown	General American Transportation Corp., New York, N.Y	Nov. 9, 1951
2,504,530	Vacuum leak detector method	R. B. Jacobs	Scientific Service Inc., Albany, Calif	Apr. 9, 1952
			Beckman Instruments, Inc., South Pasaenda, Calif	Feb. 17, 1955
2,504,585	Cyclotron targets	A. F. Reid	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,506,419	Detecting ionizing particles	E. R. Graves	Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2,506,431	Pressure measuring device	W. R. Perret, T. Davis	Beva Laboratory, Trenton, N.J	Oct. 19, 1950
2,506,435	Radiation measurement	B. B. Rossi, J. S. Allen	do	Do.
2,506,438	Electrolytic processes for fluorine	G. C. Whitaker	Hooker Electrochemical Co., Niagara Falls, N.Y	Nov. 15, 1951
			Harshaw Chemical Co., Cleveland, Ohio	Dec. 3, 1951
			Fine Organics, Inc	Jan. 17, 1951
			Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2,506,944	Neutron meter	L. H. Stauffer	P. J. McNamara, Borman, N. Dak	Dec. 19, 1950
2,506,945	Treatment of pitchblende ores	H. C. Thomas, A. S. Tomcufcik	do	Do.
2,507,301	Apparatus for controlling magnetic fields	H. W. Fullbright	Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2,507,301	do	do	Packard Manufacturing Co., Jacksonville, Fla	Dec. 16, 1955
2,508,234	Distillation apparatus	Dick Duffey	Scientific Service Inc., Albany, Calif	Apr. 9, 1952
			American Potash & Chemical, Los Angeles, Calif	Jan. 18, 1957
2,508,989	Apparatus for purifying gases	Brandegee	Scientific Service Inc., Albany, Calif	Apr. 9, 1952
2,509,609	Mechanical couplings	Borst	do	Do.
			Sunrise Products Co., Hawthorne, N.J	July 11, 1952
2,509,770	Pocket radiation alarm	R. J. S. Brown, H. G. Weiss	Charlie C. Peterson, Gladwin, Mich	June 8, 1955
2,510,864	Catalysts for fluorination	G. H. Cady	Hooker Electrochemical Co., Niagara Falls, N.Y	Nov. 15, 1951
2,510,872	Methods for regenerating antimony	F. B. Downing	do	Do.
2,512,538	Electric discharge device	Wm. R. Baker	Beva Laboratory, Trenton, N.J	Oct. 19, 1950
			Packard Manufacturing Co., Jacksonville, Fla	Dec. 16, 1955
			Kaman Aircraft Corp	Dec. 4, 1957
2,513,805	Detecting device	Wm. R. Kanne	North American Signal Co., Hyattsville, Md	Oct. 23, 1950
			Patrick J. McNamara, Borman, N. Dak	Dec. 19, 1950
			Astrolite Co., St. Louis, Mo	Apr. 11, 1950
2,514,116	Induction reamer	Wm. R. Baker	Shell Oil Co., Houston, Tex	Sept. 19, 1951
2,519,792	Electrolytic production of metallic uranium	R. Rosen	Jerry W. Walker, Memphis, Tenn	Apr. 22, 1955
2,521,495	Carbonaceous articles and production thereof	P. S. Gerald	Merrill J. Ainsworth, Northridge, Calif	May 12, 1952
2,521,626	Process for fluorintating hydrocarbons	A. F. Benning	do	Do.
2,521,937	Method of purifying inert gases	Amos S. Newton	Superior Air Products Co., Newark, N.J	Jan. 18, 1951
2,523,892	Extraction process for cerium	J. C. Warf	Nuclear Research Corp., New York, N.Y	May 17, 1951
			Southern Minerals, Inc., Haymarket, Va	May 18, 1951

			Saturnium Corp., Inc., California, Ky	June 10, 1955
			Mitten Chemicals, Inc., Alma, Mich	Jan. 18, 1956
			Michigan Chemical, Inc., St. Louis, Mich	Apr. 19, 1956
2,524,379	Neutron velocity selector	E. Fermi	Nuclear Research Corp., Philadelphia, Pa	May 17, 1951
2,524,388	Saturable core, triggered gap	Q. A. Kerns	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,524,692	Scaling circuit	W. H. Bradley	Nuclear Research Corp., New York, N.Y	May 17, 1951
2,525,197	Thermal flowmeters	Hoxton, Snoddy, & Beams	Superior Air Products Co., Newark, N.J	Jan. 18, 1951
2,526,213	Process for production of Mesitylene	Wolford M Ewalt	Michigan Chemical Corp., St. Louis, Mich	Apr. 19, 1956
2,526,825	Fluid selecting apparatus	A. O. C. nier et al	Nuclear Research Corp., Philadelphia, Pa	May 17, 1951
			Shell Oil Co., Houston, Tex	Sept. 19, 1951
2,528,415	Pump	Boorse & Boeker	Superior Air Products Co., Newark, N.J	Jan. 18, 1951
			McIntyre Engineering Co., San Francisco, Calif	Apr. 27, 1951
			Shell Oil Co., Houston, Tex	Sept. 19, 1951
2,528,436	Stuffing box and expansion joint	M. E. Johnson	McIntyre Engineering Co., San Francisco, Calif	Apr. 27, 1951
			Nuclear Research Corp	May 17, 1951
2,528,454	Coating process	H. I. Schlesinger, G. W. Schaeffer	Radiation Counter Laboratories, Chicago, Ill	Mar. 6, 1950
			Nuclear Research Corp., New York, N.Y	May 17, 1951
			American Potash & Chemical Corp., Los Angeles, Calif	Jan. 18, 1957
2,529,666	Pulse height analyzer	M. L. Sands	Beva Laboratory, Trenton, N.J	Nov. 29, 1950
2,531,106	Pocket radiation alarm	R. J. S. Brown et al	Calectron, Inc., St. Paul, Minn	Jan. 9, 1951
			Melaire Distributing Co., New York, N.Y	Jan. 16, 1951
			John D. Taylor, Lydia, S.C	Jan. 24, 1951
			Alva T. Smith Corp., Milwaukee, Wis	Feb. 6, 1951 Mar. 21, 1951
			Leon Sales Co., Inc., Buffalo, N.Y	Apr. 24, 1951
			Sunrise Products Co., Hawthorne, N.J	July 11, 1952
			Prospect Atomic Devices Corp., Hightstown, N.J	Apr. 18, 1955
			Charles C. Peterson, Gladwin, Mich	June 8, 1955
2,531,802	Filter and valve mechanism	R. Q. Boyer	Shell Oil Co., Houston, Tex	Sept. 19, 1951
2,531,811	Coulombmeter	J. E. Hammel	Minneapolis-Honeywell Regulator Co., Philadelphia, Pa	Mar. 21, 1951
			Shell Oil Co	Sept. 19, 1951
2,531,833	Tachometers	H. A. Straus	Shell Oil Co., Houston, Tex	Do.
2,531,953	Apparatus for handling radioactive solutions	W.Q. Smith, G.W. Struthers	Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2,532,874	Detection apparatus	H. L. Anderson	Minneapolis-Honeywell Regulator Co., Philadelphia, Pa	Mar. 21, 1951
2,532,891	Flanged joint sealing gasket	W. W. Chupp	Vacuum Research Co., San Leandro, Calif	Apr. 17, 1951
2,532,956	Air proportional counter	J. A. Sinpson, Jr	Scientific Service, Inc., P. J. McNamara, Borman, N. Dak.	Apr. 9, 1952 Dec. 19, 1950
2,533,102	Containers for radioactive samples	Gifford	Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2,533,149	Precipitation processes and apparatus therefor		do	Do.
2,533,491	Valve control mechanism	T. A. Abbott, J. B. McMahon	Applied Kientics Corp., Cleveland, Ohio	Oct. 6, 1955
2,533,696	Diborane purification processes	G. W. Schaeffer, G. D. Barbaras	American Potash & Chemical Corp., Los Angeles, Calif	Dec. 12, 1950
2,533,701	Collimating shield	Watt & Watson	Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2,535,355	Voltage regulation and supply	D. K. Froman	Nuclear Research Corp., New York, N.Y	May 17, 1951
2,535,886	Electronic switches	Baker & Kerns	Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2,531,830	Voltage pulse generator	A. R. Simpson	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 2, 1957
2,536,602	Automatic flange system	J. J. Goett	Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2,536,616	Preparation of uranium hydride	J. C. Warf	American Potash & Chemical Corp., Los Angeles, Calif	Jan. 18, 1957
2,535,617	Direct current negative feedback amplified	B. L. Weller	Nuclear Research Corp., Philadelphia, Pa	May 17, 1951
2,536,808	Fast impulse circuits	Higinbothan	J. G. Cottingham, Center Moriches, N.Y	Aug. 25, 1952
			Nuclear Research Corp., Philadelphia, Pa	May 17, 1951
			Daystrom Instrument Division, Daystrom, Inc	Feb. 25, 1955

SCHEDULE A—Continued

List of presently owned Commission patents on which nonexclusive royalty-free licenses in all fields have been granted to the licensee upon request—Continued

Patent No.	Subject matter	Inventors	Contractor and address	Date of license
2, 536, 991	Radiation detector	Wollan & Pardue	Tele-Vision Clock Corporation of America, Pittsburgh, Pa.	Apr. 11, 1951
			Nuclear Research Corp., Philadelphia, Pa	May 17, 1951
2, 537, 775	Ion vacuum gage	MacNeille	Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2, 537, 777	Chlorofluoreheptanes	E. T. McBee	Hooker Electrochemical Co., Niagara Falls, N.Y	Nov. 15, 1951
2, 538, 632	Combination beta and gamma chamber	Tompkins	Nuclear Research Corp., Philadelphia, Pa	May 17, 1951
2, 539, 282	Rare earth separation by adsorption and desorption.	F. H. Spedding, A. F. Voight	Maywood Chemical Co., Maywood, N.J	Mar. 10, 1950
			Southern Minerals, Inc., Haymarket, Va	May 18, 1951
			Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
			Research Laboratories of Colorado, Inc	Mar. 14, 1955
			Jerry Walker, Memphis, Tenn	Apr. 22, 1955
			Saturnium Corp., Inc., California, Ky	June 10, 1956
			Mitten Chemicals, Inc., Alma, Mich	Jan. 18, 1956
			Michigan Chemical Corp., St. Louis, Mich	Apr. 18, 1956
2, 539, 578	Bearing test apparatus	Headley	Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2, 504, 248	Manufacture of fluorine by electrolysis	R. C. Cowning	E. I. du Pont de Nemours & Co., Washington, D.C	Apr. 17, 1951
			Pennsylvania Salt Manufacturing Co., Wyndmoor, Pa	June 22, 1951
			Hooker Electrochemical Co., Niagara Falls, N.Y	Nov. 15, 1951
2, 540, 941	Latch mechanism	Carber & Grapham	Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2, 540, 960	Electrolytic cells	S. G. Osborne	Hooker Electrochemical Co., Niagara Falls, N.Y	Nov. 15, 1951
			Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2, 540, 944	Sampling apparatus handforth		Nuclear Research Corp	May 17, 1951
			Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2, 541, 190	The fluorination of lubricating oil	A. F. Benning	Hooker Electrochemical Co., Niagara Falls, N.Y	Nov. 15, 1951
2, 541, 198	Amplifier	Brenholdt	Nuclear Research Corp., Philadelphia, Pa	May 17, 1951
2, 541, 599	Radiography	P. Morrison	do	Do.
			Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2, 541, 940	Electronic circuit	B. B. Rossi et al	Nuclear Research Corp., Philadelphia, Pa	May 17, 1951
2, 542, 905	Apparatus for measuring pressure	E. T. Booth, Jr., S. Cromer, F. L. Alexander.	Minneapolis-Honeywell Regulator Co., Philadelphia, Pa	Mar. 21, 1951
			Scientific Service, Inc., Albany, Calif	Apr. 9, 1952
2, 543, 511	Preparation of diborane	Schlesinger & Brown	Allied Process Co., New York, N.Y	Aug. 3, 1951
			Aerojet Engineering Corp., Azusa, Calif	July 2, 1952
			American Potash & Chemical Co., Los Angeles, Calif	Jan. 18, 1957
2, 544, 277	Preparation of uranium nitride	A. S. Newton & O. Johnson	Southern Minerals, Inc., Haymarket, Va	June 5, 1953
2, 544, 285	Electrolytic cells	K. E. Stuart, S. G. Osborne	Hooker Electrochemical Co., Niagara Falls, N.Y	Nov. 15, 1951
2, 544, 472	Preparation of diboram	Schlesinger & Brown	Allied Process Co., New York, N.Y	Aug. 3, 1951
			Aerojet Engineering Corp., Azusa, Calif	July 2, 1952
			American Potash & Chemical Corp., Los Angeles, Calif	Jan. 18, 1957
2, 545, 595	Linear accelerators	L. W. Alvarez	Jerry W. Walker, Memphis, Tenn	Apr. 22, 1955
			Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2 545, 633	Preparation of lithium borohydride	Schlesinger & Brown	Allied Process Co., New York, N.Y	Aug. 3, 1951

2,545,924	Fast impulse circuits	C. W. Johnstone	Aerojet Engineering Corp., Azusa, Calif	July	2, 1952
2,546,933	Method of dissolving thorium values	F. L. Steahly, R. W. Stoughton, F. W. Schuler.	American Potash & Chemical Corp., Los Angeles, Calif	Jan.	18, 1957
			Preston W. Byington, Los Alamos, N. Mex	Jan.	12, 1955
			Southern Minerals, Inc., Haymarket, Va	June	5, 1953
2,546,953	Zirconium hafnium separation	K. Street, Jr	Michigan Chemical Corp. St. Louis, Mich	Apr.	19, 1956
			Southern Minerals, Inc., Haymarket, Va	June	5, 1953
			Jerry Walker, Memphis, Tenn	Apr.	22, 1955
2,546,963	Zirconium-hafnium separation processes	do	Hugo Neu Corp., New York, N.Y	Feb.	3, 1956
			Michigan Chemical Corp., St. Louis, Mich	Apr.	19, 1956
2,549,988	Manufacturing of organic fluorine compounds	M. A. Perkins	Hooker Electrochemical Co., Niagara Falls, N.Y	Nov.	15, 1951
2,550,488	Radiation counter	C. R. March	Sunrise Products Co., Hawthorne, N.J	July	11, 1952
2,550,878	Pulsing circuit	H. H. Staub	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec.	4, 1957
2,551,541	Vacuum pumping method with mechanical oil sealed pumps.	F. A. Knox	National Research Corp., Cambridge, Mass	Dec.	18, 1951
			Kinney Manufacturing Division of New York Air Brake Co.	June	11, 1954
			National Lead Co. of Ohio	Nov.	22, 1954
2,551,543	The production of uranium peroxide	Paul Mohr	Southern Minerals, Inc., Haymarket, Va	June	5, 1953
2,551,544	Mass spectrometer	Nier & Inghram	W. M. Welch Manufacturing Co., Chicago, Ill	Sept.	5, 1951
			Beckman Instruments, Inc., South Pasadena, Calif	Feb.	17, 1955
2,554,649	The separation of radium from barium	E. T. Tompkins	Southern Minerals, Inc., Haymarket, Va	June	5, 1953
2,555,512	Preparation of diborane	Schlesinger & Brown	Allied Process Co., New York, N.Y	Aug.	3, 1951
			American Potash & Chemical Co., Los Angeles, Calif	Jan.	18, 1957
2,555,906	A valve	R. B. Pontius	American Instrument Co., Silver Spring, Md	Sept.	26, 1951
2,558,377	Preparation of compacts of high density uranium hydride.	S. I. Weissman and M. L. Perlman	American Potash & Chemical Co., Los Angeles, Calif	Jan.	18, 1957
2,558,698	Improvement in electromagnetic pumps	E. J. Wade	Melaire Distributing Co., New York, N.Y	Aug.	17, 1951
			Shell Oil Co., Houston, Tex	Sept.	19, 1951
			Packard Manufacturing Co., Jacksonville, Fla	Dec.	16, 1955
2,559,259	Method of making a source of beta rays	J. R. Raper	John Burnham, Camarillo, Calif	Nov.	6, 1951
2,561,526	Production of pure ductile vanadium from vanadium oxide.	R. K. McKechnie, A. U. Seybolt, J. E. Gray.	Vanadium Corporation of America, New York, N.Y	Apr.	11, 1958
2,562,150	Electrical contacts for electrolytic cells	S. G. Osborne	Hooker Electrochemical Co., Niagara Falls, N.Y	Nov.	15, 1951
			Pennsylvania Salt Co., Wyndmoor, Pa	Jan.	2, 1952
2,562,153	Vacuum distillation	T. I. Taylor	Shell Development Co., Emeryville, Calif	July	24, 1951
2,562,159	Production of xylene hexafluoride	B. H. Wojcik, A. H. Maude	Hooker Electrochemical Co., Niagara Falls, N.Y	Nov.	15, 1951
2,558,485	Cable testing systems and methods		Shell Oil Co., Houston, Tex	Sept.	19, 1951
			Sunrise Products Co., Hawthorne, N.J	July	11, 1952
2,564,024	Method of making holocarbon polymers	W. T. Miller	United States Cosmetic Co., Chicago, Ill	Oct.	29, 1951
2,564,241	Extraction process for cerium	J. C. Warf	Southern Minerals, Inc., Haymarket, Va	Sept.	22, 1953
			Saturnium Corp., Inc., California, Ky	June	10, 1955
			Mitten Chemicals, Inc., Alma, Mich	Jan.	18, 1956
			Michigan Chemical Corp., St. Louis, Mich	Apr.	19, 1956
2,566,052	Process for photochemical chlorination of hydrocarbons.	W. S. Beanblossom	Hooker Electrochemical Co., Niagara Falls, N.Y	Nov.	15, 1951
2,566,065	Process for photochemical of hydrocarbons	A. Laverde, W. S. Beanblossom	do	Do.	
2,566,665	Zirconium and hafnium separation process	Huffman & Beaufait	Southern Minerals, Inc., Haymarket, Va	Sept.	22, 1953
			Hugo Neu Corp., New York, N.Y	Feb.	3, 1956
			Michigan Chemical Corp., St. Louis, Mich	Apr.	19, 1956
2,567,145	Method of preparing U pentafluoride	Corignan	Fine Organics, Inc., New York, N.Y	Jan.	17, 1952
2,567,518	Preparation of beryllium nitride	Langsdorf	do	Do.	

SCHEDULE A—Continued

List of presently owned Commission patents on which nonexclusive royalty-free licenses in all fields have been granted to the licensee upon request—Continued

Patent No.	Subject matter	Inventors	Contractor and address	Date of license
2,567,661	Zirconium and hafnium recovery and purification process.	J. A. Ayers	Southern Minerals, Inc., Haymarket, Va	Sept. 22, 1953
			Hugo Neu Corp., New York, N.Y	Feb. 3, 1956
2,568,642	The production of dichlorododecafluoroheptane thereof.	K. W. Krantz	Hooker Electrochemical Co., Niagara Falls, N.Y	Nov. 15, 1951
			Fine Organics, Inc., New York, N.Y	Jan. 17, 1952
2,568,660	Improved chemical process	Rosen	do	Do.
2,569,232	Filter	R. DiLiban	Beckman Division, Beckman Instruments, Inc., South Pasadena, Calif.	Feb. 17, 1955
2,571,237	Adsorption separation of hafnium	Hansen	Southern Minerals, Inc., Haymarket, Va	Sept. 22, 1953
			Kabushiki Kaisha Ishizuka Kenkyujo, Japan	Apr. 2, 1956
2,572,600	Mass spectrograph	A. J. Dempster	Beckman Instruments, Inc., South Pasadena, Calif	Feb. 17, 1955
2,574,632	Radiation detection and measuring apparatus and method.	D. W. Engelkemeir & N. Sugarman	Minneapolis-Honeywell Regulator Co., Philadelphia, Pa	Feb. 21, 1952
2,574,841	Timing apparatus	A. W. Hughes, W. M. Powell	Sunrise Products Co., Hawthorne, N.J	July 11, 1952
2,575,760	Preparation of heavy metal borohydrides	Hockstra & Katz	American Potash & Chemical, Los Angeles, Calif	Jan. 18, 1957
2,569,854	Drill tools	A. Hatcher	William Venema, Hawthorne, N.J	Oct. 22, 1953
2,575,760	Preparation of heavy metal borohydrides	Hockstra & Katz	American Potash & Chemical, Los Angeles, Calif	Jan. 18, 1957
2,575,775	Diaphragm valve	W. O. Teeters	Applied Kinetics Corp., Cleveland, Ohio	Oct. 6, 1955
2,576,600	A device for generating neutrons	Hanson	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,576,601	Method of accelerating ions	E. E. Hays	Bendix Aviation Corp., Detroit, Mich	Sept. 28, 1950
			Beckman Instruments, Inc., South Pasadena, Calif	Feb. 17, 1955
2,577,696	Electric positioning proportional floating control.	Abbott & McMahon	Minneapolis-Honeywell Regulator Co., Philadelphia, Pa	Feb. 21, 1952
2,577,707	Pulse transformer	Kerns & Baker	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,579,231	Electromagnetically operated counters	M. I. Goldberg, H. D. Goldberg	Sunrise Products Co., Hawthorne, N.J	July 11, 1952
2,579,243	Method for the production of radioactive isotopes.	Reid	Southern Minerals, Inc., Haymarket, Va	Sept. 22, 1953
2,579,994	Neutron density indicator devices	W. H. Zinn	Minneapolis-Honeywell Regulator Co., Philadelphia, Pa	July 27, 1953
			Leeds & Northrup Co., Philadelphia, Pa	June 12, 1958
2,580,358	Method for spring perhaloacetyl peroxide and stabilized perhaloacetyl peroxide.	Miller, et al	Lucidol Division, Novadel-Agene Corp., Buffalo, N.Y	Apr. 16, 1952
2,580,360	Shields	P. Morrison	Campbell X-Ray Corp., Boston, Mass	Aug. 27, 1953
2,580,373	Process for preparing perhalozcetyl perioxide	G. Zimmerman	Lucidol Division, Novadel-Agene Corp., Buffalo, N.Y	Apr. 16, 1952
2,581,863	Process for electrodepositing uranium dioxide	M. Kahn	Pivot Rock Mining, Inc., Los Alamos, N. Mex	Mar. 19, 1956
2,583,121	Mass spectrometer ion source	F. L. Reynolds	Beckman Instruments, Inc., South Pasadena, Calif	Feb. 17, 1955
2,584,801	Pipe extractor	S. T. Handforth	Sunrise Products Co., Hawthorne, N.J	July 11, 1952
2,584,816	Control system	M. L. Sands	Arthur Harris & Co., Chicago, Ill	May 29, 1952
			Hughes Plating Co., Garfield Heights, Ohio	July 5, 1955
2,585,702	Spectrometers	R. W. Thompson, W. T. Leland	Beckman Instruments, Inc., South Pasadena, Calif	Feb. 17, 1955
2,586,027	Casting apparatus	C. F. Gray	Sunrise Products Co., Hawthorne, N.J	July 11, 1952
2,587,426	Pulse forming network	W. R. Aiken	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957

2,587,919	Electrical apparatus for simulating the time dependent response characteristic of a neutronic reactor.	H. A. Strauss & B. R. Persa, Jr.	Leeds & Northrup Co., Philadelphia, Pa	June 15, 1956
2,588,153	Method of making metal hydride	Amos S. Newton	American Potash & Chemical Co., Los Angeles, Calif	Jan. 18, 1957
			Kaman Aircraft Corp	Dec. 4, 1957
2,588,466	Electrical generator	A. R. Barnes	Allis-Chalmers Manufacturing Co., Milwaukee, Wis	Mar. 21, 1956
2,588,789	Neutron detectors	W. H. Zinn	Minneapolis-Honeywell Regulator Co., Philadelphia, Pa	May 27, 1952
2,591,998	Leak detector	W. R. Baker	Sunrise Products Co., Hawthorne, N.J	July 11, 1952
			Beckman Instruments, Inc	Feb. 17, 1955
2,594,970	Viewing device for radioactive material	G. S. Monk	Henry W. Phillips, Paducah, Ky	Oct. 8, 1952
2,595,134	Universal manipulator for grasping tools	C. M. Gordon	do	Do.
			Borg-Warner Corp., Chicago, Ill	Aug. 15, 1956
			Alderson Research Laboratories, Inc., New York, N.Y	Apr. 15, 1957
2,595,550	Radiation counter	J. A. Simpson, Jr	Henry W. Phillips, Paducah, Ky	Oct. 8, 1952
2,595,552	Photomultiplier coincidence circuit	R. E. Thomas	Sunrise Products Co., Hawthorne, N.J	July 11, 1952
2,595,924	Ovaterary bismuth alloy	H. A. Wilhelm, O. N. Carlson	Henry W. Phillips, Puducah, Ky	Oct. 8, 1952
2,596,047	Uranium-aroyl aldehyde complexes and method of making same.	Schlesinger & Brown	American Potash & Chemical Corp., Los Angeles, Calif	Jan. 18, 1957
2,596,500	Pocket radiation alarms	E. W. Molloy	National Technical Laboratories, New York, N.Y	May 17, 1950
			Melaire Distribution Co., New York, N.Y	Jan. 29, 1951
			Sunrise Products Co., Hawthorne, N.J	July 11, 1952
			Moses Leavell, Waukegan, Ill	Aug. 13, 1952
			Wm. Venema, Hawthorne, N.J	Oct. 22, 1953
			Charlie C. Peterson, Gladwin, Mich	June 8, 1955
2,596,530	Vibration measuring device	H. F. Clarke	M. W. Kellogg Co., New York, N.Y	Aug. 6, 1952
2,596,956	Electronic relay circuit	L. G. Nierman	Sunrise Products Co., Hawthorne, N.J	July 11, 1952
			Greenleaf Manufacturing Co. St. Louis, Mo	Jan. 6, 1953
			MacKnight & Hoffman, Inc., Providence, R.I	Apr. 2, 1953
2,588,504	Thermoelectrically balanced network	Pawlicke	Minneapolis-Honeywell, Philadelphia, Pa	May 27, 1952
2,597,535	Radioactive assay apparatus	E. G. Segre	Jerry W. Walker, Memphis, Tenn	Apr. 22, 1955
2,597,596	Insulator bushing seal	J. D. Reid	Strat-O-Seal Manufacturing Co., Chicago, Ill	Sept. 25, 1952
2,598,283	Copolymers of perfluorproprene and tetrafluoroethylene and method of making same.	Wm. T. Miller	E. I. duPont de Nemours & Co., Inc., Washington, D.C	Oct. 28, 1953
2,599,182	Pulse type transformer	Quentin A. Kerns	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,599,203	Preparation of aluminum borohydride	Schlesinger & Brown	American Potash & Chemical, Los Angeles, Calif	Jan. 18, 1957
2,600,057	High-voltage multiple-core transformer	A. A. Kerns	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,600,151	Ion producing mechanism	J. G. Backus	Beckman Instruments, Inc., South Pasadena, Calif	Feb. 17, 1955
2,600,370	Uranium borohydride and method of making the same.	Schlesinger & Brown	American Potash & Chemical, Los Angeles, Calif	Jan. 18, 1957
2,600,891	Vacuum system leak detector	S. M. MacNeille	Strat-O-Seal Manufacturing Co., Chicago, Ill	Sept. 25, 1952
2,601,583	Radiation measuring instrument	C. O. Ballou	Traceriab, Inc., Boston, Mass	Mar. 8, 1950
			Atomic Engineering Corp., Grand Junction, Colo	Nov. 20, 1956
2,601,637	Pocket ionization chamber	J. E. Rose, E. W. Hinspater	Jerry W. Walker, Memphis, Tenn	Apr. 22, 1955
2,602,632	High-speed bearing and turbine	J. T. Serduke, J. T. Webster	Greenleaf Manufacturing Co., St. Louis, Mo	Jan. 6, 1953
2,602,725	Method of producing zirconium tetrafluoride	W. Wilhelm	Southern Minerals, Inc., Haymarket, Va	Sept. 22, 1953
2,602,871	Nickel welding	R. A. Noland, C. T. Szymko	Youngstorn Welding & Engineering Co	Oct. 29, 1952
2,602,898	Ion intensity control mechanism for mass spectrometer.	L. W. Meade, F. C. Armistead	Consolidated Engineering Corp., Pasadena, Calif	Jan. 12, 1953
			Beckman Instruments, Inc., South Pasadena, Calif	Feb. 17, 1955
2,604,612	Control circuit	O. R. Rudolph	Greenleaf Manufacturing Co., St. Louis, Mo	Jan. 6, 1953
			Master Electric Co., Dayton, Ohio	Oct. 30, 1953
			Reliance Electric & Engineering Co	Aug. 19, 1957

SCHEDULE A—Continued

List of presently owned Commission patents on which nonexclusive royalty-free licenses in all fields have been granted to the licensee upon request—Continued

Patent No.	Subject matter	Inventors	Contractor and address	Date of license
2,605,429	Portable radiation survey instrument	Herndon & R. G. Hoff	Nuclear Instrument & Chemcial	Oct. 9, 1950
			Nuclear Research Corp., Philadelphia, Pa	May 17, 1951
			Jerry Walker, Memphis, Tenn	Apr. 22, 1955
2,606,291	Method and apparatus for material separation	R. R. Wilson	Beckman Instruments, Inc., South Pasadena, Calif	Feb. 17, 1955
			do	Do.
2,606,296	Radiation counters	J. A. Simpson, Jr	Radiation Counter Laboratory, Chicago, Ill	Mar. 6, 1950
2,606,573	Adjustable venturi assembly	Wm. M. Brobeck, J. G. Darward	Minneapolis-Honeywell Regulator Co., Philadelphia, Pa	Nov. 7, 1952
			Greenleaf Manufacturing Co., St. Louis, Mo	Jan. 6, 1953
2,610,104	Precipitation of zirconium hydroxide in a readily filterable form.	Friedel	Southern Minerals, Inc., Haymarket, Va	Sept. 22, 1953
2,610,300	Flow control	R. C. Bowers, W. W. Walton	Beckman Instruments, Inc., South Pasadena, Calif	Feb. 17, 1955
2,610,303	Coincidence circuit	R. E. Bell	Borg-Warner Corp., Chicago, Ill	Apr. 19, 1957
2,612,779	Compensated thermocouple	S. F. Mulford	Minneapolis-Honeywell Regulator Co., Philadelphia, Pa	Feb. 5, 1953
2,613,235	Mega voltmeter	C. E. Grunsky	West Coast Research Co., Los Angeles, Calif	Jan. 2, 1953
2,613,236	Voltage measuring apparatus	Palevsky & Swank	Minneapolis-Honeywell Regulator Co., Philadelphia, Pa	Feb. 5, 1953
			Daystrom Instruments Division, Daystrom, Inc., Archbald, Pa.	Jan. 31, 1956
2,613,327	Improved dosimeter	Beckman, Herd & Robinson	Arnold O. Beckman, Inc., South Pasadena, Calif	Sept. 9, 1951
2,614,113	Uranium purification as complexes of esters of trioluoroacetoacetic acid.	Schlesinger & Brown	American Potash Chemical Corp., Los Angeles, Calif	Jan. 18, 1957
2,615,129	Synchro-cyclotron	C. M. McMillan	Jerry Walker, Memphis, Tenn	Apr. 22, 1955
2,615,135	Mass analyzing apparatus	Wm. E. Glenn, Jr	Beckman Instruments, Inc., South Pasadena, Calif	Feb. 17, 1955
2,615,249	Atomic airburst direction finder	G. A. Allard	New York Telephone Co., New York, N.Y	Dec. 19, 1952
2,615,798	Extraction of cerium with an organic solvent	E. Pitzer	Southern Minerals, Inc., Haymarket, Va	Sept. 22, 1953
			Saturnium Corp., Inc., California, Ky	June 10, 1955
			Mitten Chemicals, Inc., Alma, Mich	Jan. 18, 1956
			Michigan Chemical Corp., St. Louis, Mich	Apr. 19, 1956
2,615,967	Time-delay relay testing device	C. B. Gould	James Goodman, general manager, Electro Mechanical Specialty Co., Los Angeles, Calif.	Mar. 9, 1953
2,617,042	Coincidence circuit	L. F. Wouters	Jerry Walker, Memphis, Tenn	Apr. 22, 1955
2,615,129	Synchro-cyclotron	E. M. McMillan	do	Do.
2,618,750	Method of an apparatus for supplying charge material to mass spectrometers.	Parsegian & Stevens	M. W. Kellog Co., New York, N.Y	June 6, 1951
			Kellex Corp., New York, N.Y	Do.
			Beckman Instruments, Inc., South Pasadena, Calif	Feb. 17, 1955
2,619,601	Radioactivity survey apparatus	S. M. Zollers	Stevens Aviation Engineering Co., Wellesley Hills, Mass	Jan. 8, 1945
			Radio City Products Co., New York, N.Y	Mar. 19, 1954
			Reiner Electronics Co., Inc	Do.
2,620,446	Radiation detection and measuring means	LeVine & Di Giovanni	Leo Howard Kerns, Annapolis, Md	Aug. 25, 1952
			Leo E. Supina, Hartford, Conn	May 3, 1955
2,622,204	Mass spectrograph	A. E. Shaw & W. Rall	Beckman Instruments, Inc., South Pasadena, Calif	Feb. 17, 1955

Beckman Instruments, Inc., South Pasadena, Calif.	May 3, 1955			
	Feb. 17, 1955			
2,626,359	Target for particle accelerators	F. R. Weber, Jr.	Kaman Aircraft Corp., Albuquerque, N. Mex.	Dec. 4, 1957
2,628,338	Portable voltage supply for radiation counters	C. D. Gould	Detectolab Inc., Chicago, Ill.	Apr. 10, 1953
2,629,459	Filter	P. Hammond, J. A. Leary	Johns-Manville Corp., New York, N.Y.	Apr. 23, 1953
			E. D. Bullard Co., San Francisco, Calif.	May 8, 1953
2,629,837	Radioactive resistor	J. M. Benade, E. E. Goodale, Wm. P. Jesse.	Detectolab Inc., Chicago, Ill.	Apr. 10, 1953
2,631,170	Process for the preparation of fluorocarbons	R. D. Fowler	Purdue Research Foundation	Jan. 29, 1953
2,632,103	Stabilized pulse circuit	M. W. Horrell	Radio City Products Co., New York, N.Y.	Mar. 19, 1954
			Reiner Electronics Co. Inc., New York, N.Y.	Mar. 19, 1953
2,632,574	Remote-control manipulator	R. C. Goertz	Detectolab Inc., Chicago, Ill.	Apr. 10, 1953
			Prospect Atomic Devices Corp., Hightstown, N.J.	Apr. 18, 1955
			International Atomic Devices Corp., Hightstown, N.J.	Sept. 16, 1955
			Borg-Warner Corp., Chicago, Ill.	Aug. 15, 1956
2,633,540	Electrical apparatus and method	V. C. Wilson, J. A. Simpson, Jr.	Detectolab Inc., Chicago, Ill.	Apr. 10, 1953
2,634,374	Pocket radiation meter	F. R. Shonka	John E. Barbera, Elmsford, N.Y.	July 10, 1953
			Prospect Atomic Device Corp., Hightstown, N.J.	Apr. 18, 1955
			Charlie C. Peterson, Gladwin, Mich.	June 8, 1955
			International Atomic Devices Corp., Hightstown, N.J.	Sept. 16, 1955
			Flitton & Kissinger Engineering Corp., Northridge, Calif.	Oct. 3, 1957
2,635,037	Preparation of zirconium	H. A. Wilhelm, K. A. Walsh	Hugo Neu Corp., New York, N.Y.	Feb. 3, 1956
2,636,044	Rare earth separation by anion exchange	E. H. Huffman & R. L. Oswalt	Saturnium Corp., Inc., California, Ky.	June 10, 1955
			Mitten Chemicals, Inc., Alma, Mich.	Jan. 18, 1956
			Michigan Chemical Corp., St. Louis, Mich.	Apr. 19, 1956
2,636,886	Uranium complexes of heterocyclic diketones	Schlesinger & Brown	American Potash & Chemical Corp., Los Angeles, Calif.	Jan. 18, 1957
2,636,990	Ion source unit	Gow & Foster	Beckman Instruments, Inc., South Pasadena, Calif.	Feb. 17, 1955
			Lawrence Ruby, Berkeley, Calif.	Apr. 11, 1957
			Kaman Aircraft Corp., Albuquerque, N. Mex.	Dec. 4, 1957
2,637,882	Vacuum die casting	R. F. Plott	Alloy Die Casting Co., Los Angeles, Calif.	Feb. 10, 1955
2,640,924	Accelerator target	E. M. McMillan	Kaman Aircraft Corp., Albuquerque, N. Mex.	Dec. 4, 1957
2,640,935	Mass spectrometer control	S. B. Spracklen	Beckman Instruments, Inc., South Pasadena, Calif.	Feb. 17, 1955
2,642,527	Multichannel analyzer	Geo. G. Kelley	Radio City Products Co.	Mar. 19, 1954
			Reiner Electronics Co., Inc., New York, N.Y.	Do.
2,643,342	Ionization gage	K. M. Sinpson	Vacuum Tube Products, Oceanside, Calif.	Feb. 10, 1954
2,643,360	Voltage supply regulator	E. Fairstein	Radio City Products Co., New York, N.Y.	Mar. 19, 1954
			Reiner Electronics Co., Inc., New York, N.Y.	Do.
2,646,252	Well casing soil sampler	H. E. Hylbak	Prospect Atomic Devices Corp., Hightstown, N.J.	Apr. 18, 1955
			International Atomic Device Corp., Hightstown, N.J.	Sept. 16, 1955
2,643,341	Mass spectrometer ion source	W. T. Leland	Beckman Instruments, Inc., South Pasadena, Calif.	Feb. 17, 1955
2,646,346	Multistage mixer-settler apparatus	Coplan & Zebrowdki	Portland Copper & Tank Works, Inc., South Portland, Maine.	Apr. 29, 1954
			Allied Engineering Co., Alameda, Calif.	July 6, 1954
			Blaw-Knox Co., Pittsburgh, Pa.	May 25, 1955
			Westlake Manufacturing Corp., Canastota, N.Y.	Feb. 12, 1958
2,646,925	Electrical integrator	M. Bevis	Radio City Products Co., New York, N.Y.	Mar. 19, 1954
			Reiner Electronics Co., Inc., New York, N.Y.	Do.
2,647,770	Sealed telescopic pipe joint	Tollefsbol	Fluor Corp., Ltd., Los Angeles, Calif.	Dec. 8, 1953
2,647,998	Method and apparatus for determining frequency.	G. Paxson	Radio City Products Co., New York, N.Y.	Mar. 19, 1954
			Reiner Electronics Co., Inc., New York, N.Y.	Do.
2,649,671	Bridge for resistance measurement	R. J. Smith	Dale Products, Inc., Columbus, Nebr.	Feb. 2, 1954
			Precise Measurements Co., Brooklyn, N.Y.	Feb. 15, 1954
			Radio City Products Co., New York, N.Y.	Mar. 19, 1954
			Reiner Electronics Co., Inc., New York, N.Y.	Do.

SCHEDULE A—Continued

List of presently owned Commission patents on which nonexclusive royalty-free licenses in all fields have been granted to the licensee upon request—Continued

Patent No.	Subject matter	Inventors	Contractor and address	Date of license
2,651,723	Beam regulator	Wm. R. Baker	Vacuum Tube Products, San Leandro, Calif.	Dec. 7, 1953
			Beckman Instruments, Inc., South Pasadena, Calif.	Feb. 17, 1955
2,651,726	Ionization chamber circuit	Froman, Hinch & Watts	Vacuum Tube Products, San Leandro, Calif.	Dec. 7, 1953
2,651,751	Apparatus for measuring resistance	Heath	Stevens Aviation Engineering Co.	Jan. 8, 1954
			Dale Products, Inc., Columbus, Nebr.	Feb. 2, 1954
2,651,940	Apparatus for measuring liquid level	K. H. Kline	Stevens Aviation Engineering Co., Wellesley Hills, Mass.	Jan. 8, 1954
2,652,510	Gas discharge device	Landrey & Mazzei	Kaman Aircraft Corp., Albuquerque, N.Mex.	Dec. 4, 1957
2,652,778	Electromagnetic centrifugal pump	Crever	Stevens Aviation Engineering Co., Wellesley Hills, Mass.	Jan. 8, 1954
2,654,840	Pulse generator	Wiegand	Radio City Products Co., New York, N.Y.	Feb. 19, 1954
			Reiner Electronics Co., Inc., New York, N.Y.	Mar. 19, 1954
			Kaman Aircraft Corp., Albuquerque, N.Mex.	Dec. 4, 1957
2,654,845	Vapor detector	C. S. Presens	Emil Greiner Co., New York, N.Y.	Feb. 5, 1953
			J. Greenspan, Brooklyn, N.Y.	Feb. 9, 1953
			Mine Safety Appliances Co., Pittsburgh, Pa.	Mar. 9, 1953
			Union Industrial Equipment Corp., White Plains, N.Y.	Jan. 18, 1956
			Reynolds Electrical & Engineering Co., Inc., Santa Fe, N. Mex.	Sept. 6, 1956
2,654,851	Beam deflector	Scalise	Vacuum Tube Products, Oceanside, Calif.	Dec. 7, 1953
2,655,107	Electromagnetic fluid pump	N. H. Godbold	Stevens Aviation Engineering Co., Wellesley Hills, Mass.	Jan. 8, 1954
2,656,476	Survey instrument	R. H. Firminhac	Radio City Products Co., New York, N.Y.	Mar. 19, 1954
			Reiner Electronics Co., Inc., New York, N.Y.	Do.
2,656,527	Signal deviation warning system	J. E. Tillman	John E. Tillman, Albuquerque, N. Mex.	Feb. 19, 1951
			Central Station Alarm Co., Dallas, Tex.	Mar. 9, 1951
			Photobell Co., New York, N.Y.	June 4, 1951
			Phillips Engineering Co., Schenectady, N.Y.	June 7, 1951
			Roy Hann, Sacramento, Calif.	June 13, 1951
			American District Telegraph Co., New York, N.Y.	Aug. 9, 1951
			N. A. Cordova & E. Komarek, Albuquerque, N. Mex.	Sept. 25, 1951
			Shell Oil Co., Houston, Tex.	Sept. 19, 1951
			Stevens Aviation Engineering Co., Albuquerque, N. Mex.	Jan. 8, 1954
			General Electric Co., Schenectady, N.Y.	Feb. 10, 1954
			Charlie C. Peterson, Gladwin, Mich.	June 8, 1955
			Fred'k L. Lemm, Houston, Tex.	Feb. 16, 1956
			E. L. Awad, Hialeah, Fla.	June 14, 1956
2,659,013	Badge meter	D. M. Davis & J. C. Hart	R. S. Landauer, Jr., Park Forest, Ill.	July 6, 1954
			Prospect Atomic Devices Corp., Hightstown, N.J.	Apr. 18, 1955
			International Atomic Devices Corp., Hightstown, N.J.	Sept. 16, 1955
2,659,589	Integrating accelerometer	C. N. Hickman	Bill Jack Scientific Instrument Co., Solana Beach, Calif.	July 2, 1954
2,660,677	Ion selector	A. O. C. Nier	Beckman Instruments, Inc., South Pasadena, Calif.	Feb. 17, 1955
2,665,384	Ion accelerating and focusing system	H. P. Yockey	Kaman Aircraft Corp., Albuquerque, N. Mex.	Dec. 4, 1957
2,666,865	Survey instrument	Borkowski	Raytheon Manufacturing Co., Waltham, Mass.	Apr. 2, 1952

2,667,104	Light valve	Buck	Bill Jack Scientific Instrument Co., Solana Beach, Calif	July 2, 1954
2,667,582	Mass separator	J. G. Backus	Beckman Instruments, Inc., South Pasadena, Calif	Feb. 17, 1955
2,668,260	Ion source	Barnett & Mills	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,668,272	Voltage regulator	E. J. Groth, Jr	Stevens Aviation Engineering Co., Wellesley Hills, Mass	May 18, 1954
2,668,473	Continuous writing high-speed frame camera	B. Brixner	Beckman & Whitley, Inc., San Carlos, Calif	Apr. 11, 1958
2,668,656	Sylphon sealed pump	E. T. Booth et al	Stevens Aviation Engineering Co., Albuquerque, N. Mex	May 18, 1954
2,688,703	Radioactive logging apparatus	DiGiovanni, Graveson & Yoli	Nuclear Instrument Corp., Venice, Calif	June 21, 1955
			Rayalarm, Inc., Chicago, Ill	May 3, 1955
			Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,668,934	Relay system	L. G. Nierman	Stevens Aviation Engineering Co., Wellesley Hills, Mass	May 18, 1954
2,669,183	Electromagnetic fluid pump	Godbold	do	Do.
2,669,931	do		do	Do.
2,670,353	Process for the production of fluorinated dike-stones.	H. R. Lehman	Dow Chemical Co., Midland, Mich	Sept. 24, 1953
			Advance Solvents & Chemical Corp., New York, N.Y	Apr. 13, 1954
2,672,154	Pressure regulator	W. B. Leslie et al	Stevens Aviation Engineering Co., Wellesley Hills, Mass	May 18, 1954
2,672,556	Electronic timing device	R. B. Leighton	Same as 2,672,154	Apr. 13, 1954
2,675,487	Exposure capsule handling device	P. O. Schallert et al	do	Do.
2,677,668	Stabilization of reduced metal catalysts	J. E. Ahlberg	Girdler Co., Lexington, Ky	June 1, 1955
2,677,669	Stepwise stabilization of reduced metal catalysts.		do	Do.
2,679,940	Electric manipulator	Goertz & Uecker	Borg-Warner Corp., Chicago, Ill	Aug. 15, 1956
2,681,416	Neutron scintillation counter	B. Thompson	Lermac Inc., Oakland, Calif	June 9, 1953
			National Radiac, Inc., Newark, N.J	Mar. 20, 1956
2,667,178	Liquid level control	Fred & Rauh	Vilter Manufacturing Co., Milwaukee, Wis	Feb. 17, 1956
2,681,907	Isolation of flavonoid compounds	S. H. Wender	University of Oklahoma, Research Institute, Norman, Okla.	May 16, 1952
2,682,352	Shipping container for radioactive material	M. B. Hawkins, E. R. Tompkins	International Atomic Devices Corp., Hightstown, N.J	Sept. 16, 1955
			C. H. Wheeler Manufacturing Co., Philadelphia, Pa	Feb. 3, 1956
2,682,364	Electronic controlled pumping system	D. S. Shover	Central Sales & Manufacturing Corp., Denville, N.J	Oct. 25, 1954
2,682,452	Extraction apparatus	L. Wainright	M. W. Kellogg Co., New York, N.Y	June 6, 1951
			Kellex Corp., New York, N.Y	Do.
2,282,453	Mixer-settler contact apparatus	Holder, Nelson, Morbeck	Blaw-Knox Co., Pittsburgh, Pa	May 25, 1955
			Same as 2,682,452	June 6, 1951
2,682,510	Gamma and X-ray dosimetric method	Taplin & Douglas	Glenn A. Smith & Associates, Los Angeles, Calif	Oct. 20, 1950
			Robert Clifford Baker, Washington, D.C	Do.
			Beesley Manufacturing Co., Los Angeles, Calif	Jan. 22, 1951
			Gibralter Chemical Co., Los Angeles, Calif	Feb. 7, 1951
			McDonald Co., Los Angeles, Calif	Feb. 16, 1951
			Willard H. Schmidt, Denver, Colo	Mar. 13, 1951
			Albert L. Kegan, Chicago, Ill	May 4, 1951
			Nuclear Research Corp., Philadelphia, Pa	May 17, 1951
			Technical Associates, Glendale, Calif	May 18, 1951
			A. Albert Alperstein, Baltimore, Md	June 4, 1951
			Raymond D. Finkle, Santa Monica, Calif	June 14, 1951
			Eugene C. Greenwood, Buena Park, Calif	Apr. 24, 1951
			Sanford C. Sigoloff, Beverly Hills, Calif	Jan. 19, 1953
			R-C Scientific Instrument Co., Inc., Playa Del Rey, Calif	Dec. 8, 1953
			Rayalarm, Inc., Chicago, Ill	June 8, 1955
			Charlie C. Peterson, Gladwin, Mich	Do.
			J. Hutner, Los Angeles, Calif	June 20, 1955
2,683,221	Particle and gamma-ray energy spectrometer	B. R. Gossick	Central Sales & Manufacturing Corp., Denville, N.J	Oct. 25, 1954

SCHEDULE A—Continued

List of presently owned Commission patents on which nonexclusive royalty-free licenses in all fields have been granted to the licensee upon request—Continued

Patent No.	Subject matter	Inventors	Contractor and address	Date of license
2,683,222	Radiation meter	Rossi & Failla	International Atomic Devices Corp., Hightstown, N.J.	Sept. 16, 1955
2,684,825	Shock or vibration isolating means	D. W. Laviana	T. R. Finn & Co., Inc., Hawthorne, N.J.	Feb. 15, 1955
2,685,027	Radioactivity measurement	L. W. Alvarez	Rayalarm, Inc., Chicago, Ill.	May 3, 1955
2,686,474	Electromagnetic pump	O. O. Pulley	Applied Dynamics Corp., Natick, Mass.	July 16, 1958
2,686,827	Water cooled insulator	B. H. Roffee	Barton H. Roffee, Chicago, Ill.	Aug. 18, 1954
2,687,480	Radiation measuring device	A. J. Oklesben et al.	Rayalarm, Inc., Chicago, Ill.	May 3, 1955
2,689,318	Load torque responsive followup system	Goertz & Bevilacqua	Borg-Warner Corp., Chicago, Ill.	Aug. 15, 1956
2,689,629	Reduction of the momentum of falling bodies	Kendall & Morrison	New Mexico College of Agriculture & Mechanic Arts, State College, N. Mex.	Mar. 27, 1958
2,690,468	Drill hole logging probe	Faul & Smith	Nuclear Instrument Corp., Venice, Calif.	June 21, 1955
			Kaman Aircraft Corp., Albuquerque, N. Mex.	Dec. 4, 1957
2,690,515	Method and apparatus for producing ions	J. E. Mack	do	Do.
2,694,146	Pulse analyzer	E. Fairstein	Franklin Electronic Inc., Bridgeport, Pa.	Dec. 10, 1956
2,695,213	Recovery of zirconium tetrachloride from its complex compounds.	Fernelius	Hugo Neu Corp., New York, N.Y.	Feb. 3, 1956
2,695,715	Remote control manipulator	Goertz & Schmitt, Jr.	The Greenleaf Manufacturing Co., St. Louis, Mo.	May 3, 1955
			Borg-Warner Corp., Chicago, Ill.	Aug. 15, 1956
2,696,050	Atomic bomb air zero locator	B. C. Taylor	Tobacco Machine Supply Co., Linden, N.J.	Jan. 13, 1955
2,696,554	Radio-electric generator	P. E. Ohmart	Beckman Instruments, Inc., South Pasadena, Calif.	May 21, 1954
			Ohmart Corp., Dayton, Ohio	Feb. 3, 1955
			Scientific Specialties Corp., Boston, Mass.	Apr. 18, 1955
2,697,518	Flotation methods for uranium ores	G. A. Bennett, P. L. Veltman	Pivot Rock Mining Co., Inc., Los Alamos, N. Mex.	Mar. 19, 1956
2,697,529	Apparatus for handling frangible articles by remote control.	J. P. Hubbell et al.	Singmaster & Brewer, New York, N.Y.	Mar. 7, 1955
2,698,290	Isotope of curium having a mass number of 238	G. T. Seaborg et al.	Morris Lessem, Camden, N.J.	June 10, 1955
2,700,736	Radiation quantities	N. O. Roberts	Robert Clifford Baker, Washington, D.C.	Nov. 20, 1950
			Willard H. Schmidt, Denver, Colo.	Mar. 13, 1951
			Nuclear Research Corp., Philadelphia, Pa.	May 17, 1951
2,700,736	Radiation quantities	N. O. Roberts	J. Hutner, Los Angeles, Calif.	July 20, 1955
2,708,656	Apparatus for controlling magnetic fields	H. W. Fulbright et al.	Packard Manufacturing Co., Jacksonville, Fla.	Dec. 16, 1955
2,710,354	Ion source	M. G. Inghram, D. C. Hess	Kaman Aircraft Corp., Albuquerque, N. Mex.	Dec. 4, 1957
2,713,554	Electrolytic method of recovery of thorium from monazite sand.	E. C. Pitzer	Henry E. Pyne, Stockton, Calif.	Jan. 18, 1956
2,713,677	Method and apparatus for discriminating frequency modulated records.	J. H. Scott et al.	Ampex Corp., Redwood City, Calif.	Nov. 5, 1954
			Consolidated Engine Corp., Pasadena, Calif.	Dec. 15, 1954
2,714,554	Production of gadolinium	Spedding & Daane	Saturnium Corp., Inc., California, Ky.	June 10, 1955
			Mitten Chemicals, Inc., Alma, Mich.	Jan. 18, 1956
			Research Laboratory of Col., Inc., Newton, Ohio	Feb. 1, 1956
			Michigan Chemical Corp., St. Louis, Mich.	Apr. 19, 1956

			Instrument Division, Daystrom, Inc., Arch-	Feb. 25, 1955

2,714,677	Compensated ionization chamber	S. M. MacNielle	Daystrom Instrument Division, Daystrom, Inc., Archbald, Pa.	Feb. 25, 1955
2,715,682	Ion source for calutrons	E. O. Lawrence	National Rocket Corp., Culver City, Calif	Jan. 7, 1957
2,715,693	Deep collimatin slot	S. MacNeille & K. MacKensie	do	Do.
2,715,695	Ion producing mechanism	J. A. DeJuren	do	Do.
2,716,051	A method of producing airconium halides	I. E. Campbell	Hugo Neu Corp., New York, N.Y	Feb. 3, 1956
2,716,141	Preparation of halo aliphatic compounds	W. T. Miller	Hooker Electrochemical Co., Niagara Falls, N.Y	Feb. 24, 1953
2,716,168	An electrical switch	F. R. Shonka	General Electric Co., Schenectady, N.Y	Sept. 13, 1951
2,716,194	Pulse generator	D. A. Mack	National Rocket Corp., Culver City, Calif	Jan. 7, 1957
2,716,197	Ion source	Jones & Wright	do	Do.
2,716,211	Thyratron trigger circuit for discharging a capacitor.	E. A. Aas	do	Do.
2,717,902	Electric discharge devices	L. F. Wouters	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,705,674	Ternary zirconium alloys	Chubb	National Rocket Corp., Culver City, Calif	Jan. 7, 1957
2,717,963	ARC discharge	Brubaker	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,717,964	Sulfur crystal counter	Parsegian et al	Hugo Neu Corp., New York, N.Y	Feb. 3, 1956
2,717,915	Production of purified	Shapiro	M. W. Kellogg Co., New York, N.Y	Feb. 18, 1953
2,719,925	Electric discharge device	Oppenheimer	Hugo Neu Corp., New York, N.Y	Feb. 3, 1956
2,720,605	Ion pump	Lawrence & Foster	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,727,995	Leak detector	Chubb & Monk	Vacuum Tube Products Co., Oceanside, Calif	Apr. 20, 1956
2,727,996	Thermal neutron shield and method for making same.	Rockwell & McKinney	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,728,861	Radiation pocket screamer	Glass	Vacuum Tube Products Co., Oceanside, Calif	Apr. 20, 1956
2,728,867	Generation of power	Wilson	Foster Wheeler Corp., New York, N.Y	Oct. 22, 1957
2,731,568	Radiation detection device	G. Failla	Ordinance Precision Manufacturing Corp., Philadelphia, Pa.	June 2, 1954
2,732,777	Ultra high-speed light shutter	B. Brixner	Gilbert Associates, Inc., Reading, Pa	Apr. 27, 1956
2,733,343	Ionization source	Ingram & Chupka	American Machine & Foundry Co., New York, N.Y	Sept. 16, 1955
2,733,348	Ion source units	Lawton & Lafferty	Pacific Transducer Corp., Los Angeles, Calif	Apr. 11, 1957
2,736,817	Pocket radiation meter	P. R. Bell, Jr	Beckman & Whitley, Inc., San Carlos, Calif	Feb. 19, 1957
2,739,237	Amplifier circuit	J. J. Stone, Jr	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,739,286	Alpha circuit meter survey	R. W. Schede	do	Do.
2,742,576	Portable scintillation survey meter	R. A. Dandl	A. C. Levine, Inc., Buffalo, N.Y	Sept. 24, 1957
2,742,587	Demountable filament assembly	Armstrong, Corbell, McPhee	Nuclear Corp. of America Inc., New York, N.Y	Sept. 17, 1956
2,743,224	Submerged reactor	L. A. Ohlinger	Detectolab Inc., Chicago, Ill	May 14, 1956
2,743,228	Electrolytic	R. Q. Boyer	Nuclear Corp. of America, New York, N.Y	Sept. 17, 1956
2,726,339	Concrete radiation shielding means	Borst & Fox	Borg-Warner Corp., Chicago, Ill	Aug. 27, 1957
2,743,371	Electronic analyzer	Q. A. Kerns	Same as 2,739,286	
2,744,893	Separation of flavonoid compounds	Wender et al	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,745,006	Binary counter	J. C. Chu & Jacobsohn	Foster Wheeler Corp., New York, N.Y	Oct. 22, 1957
2,745,552	Filter with fractional crystallization means	Bruggemen & Voorhees	Nuclear Corp. of America Inc., New York, N.Y	Sept. 17, 1956
2,745,985	Pulse amplitude analyzers	I. A. D. Lewis	Foster Wheeler Corp., New York, N.Y	Oct. 22, 1957
			Nuclear Corp. of America, Inc., New York, N.Y	Sept. 17, 1956
			University of Oklahoma Research Institute, Norman, Okla.	May 16, 1952
			Nuclear Corp. of America, Inc., New York, N.Y	Sept. 17, 1956
			MSA Research Corp., Callery, Pa	Dec. 11, 1957
			Remington Rand Univac, Philadelphia, Pa	July 16, 1958

SCHEDULE A—Continued

List of presently owned Commission patents on which nonexclusive royalty-free licenses in all fields have been granted to the licensee upon request—Continued

Patent No.	Subject matter	Inventors	Contractor and address	Date of license
2,749,520	Directional coupling means for transmission lines.	B. J. Bittner	Gulton Industries, Inc., Metuchen, N.J	Jan. 23, 1958
2,751,662	Electric grid and method of making same	Glenn & Hostetter	Earl W. Hostetter, Berkeley, Calif	Feb. 13, 1952
			Airborne Instruments Laboratory, Mineola, N.Y	June 18, 1952
			Raytheon Manufacturing Co., Chicago, Ill	June 19, 1952
			Chromatic Television Laboratories, Oakland, Calif	Aug. 4, 1952
2,752,309	Process and apparatus for water decontamination.	Emmons & Lauderdale	Cybergor, Inc., Los Angeles, Calif	May 26, 1955
2,760,064	Pulse analyzer	P. R. Bell	Daystrom Instrument, Inc., Archbald, Pa	Feb. 25, 1955
2,762,941	Positive ion electrostatic	C. M. Turner	National Rocket Corp., Culver City, Calif	Mar. 18, 1957
			Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,763,570	Wetting of heat transfers surfaces with liquefied metal heat transfer media.	Shepard & French	National Rocket Corp., Culver City, Calif	Mar. 18, 1957
2,763,816	Spark gap	Wm. R. Baker	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,764,301	Remote control manipulator	Goertz & Schmitt & Olsen	Borg-Warner Corp., Chicago, Ill	Aug. 15, 1956
2,764,689	Pulsed oscillator	W. C. Struven	National Rocket Corp., Culver City, Calif	Mar. 18, 1957
2,764,707	Ion source	Crawford & Gow & Pon & Ruby	do	Do.
			Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,770,128	Electronic pressure differential wind direction indicator.	H. Moses	National Rocket Corp., Culver City, Calif	
2,770,590	Reactor circulating system	J. R. Serduke	James T. Serduke, El Cerrito, Calif	Feb. 23, 1956
2,770,755	Linear accelerator	M. L. Good	National Rocket Corp., Culver City, Calif	Mar. 18, 1957
2,771,199	Remote control manipulator	D. G. Jelatis	Borg-Warner Corp., Chicago, Ill	Aug. 15, 1956
2,772,964	Zirconium alloys	R. B. Gordon	Zirconium Metals Corp., New York, N.Y	Dec. 4, 1957
2,774,488	Remote-control manipulator	Goertz & Schmitt & Olsen & Wehrle	Borg-Warner Corp., Chicago, Ill	Aug. 15, 1956
2,776,189	Improvement in nitric acid recovery	W. Winn	Catalytic Construction Co. of Canada, Ltd., and Eldorado Mining & Refining, Ltd., Philadelphia, Pa.	June 18, 1954
2,786,143	Source unit for producing ionized gas	Rub & Crawford & Pon	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,791,371	Radio frequency ion pump	Foster & Fairbrother	do	Do.
2,796,320	Solvent extraction process for purfication o thorium.	Spedding & Kant	W. R. Grace & Co., Baltimore, Md	Oct. 3, 1957
2,797,328	Transistor oscillator	E. G. Miller, Jr	International Electronic Research Corp., Burbank, Calif	Feb. 12, 1958
2,798,164	Portable X-ray or gamma source	S. Untermeyer	Litton Industries, Inc., Beverly Hills, Calif	Feb. 1, 1955
			Picker X-ray Corp., Waite Manufacturing Division, Inc., Cleveland, Ohio.	Oct. 3, 1957
2,798,181	Pumping ion source	J. S. Foster, Jr	Kaman Aircraft Corp., Albuquerque, N. Mex	Dec. 4, 1957
2,798,789	Method of separating rare earths	Spedding, Wherlwright & Powell	Saturnium Corp., Inc., California, Ky	June 10, 1955
			Mitten Chemicals, Inc., Alma, Mich	Jan. 18, 1956
			Michigan Chemical Corp	Apr. 19, 1956
2,799,836	Pulse transformer	Heller, Owren & Mack	Kaman Aircraft Corp., Albuquerque, N. Mex	July 16, 1957
2,804,165	Arrangement for replacing filters	Blomgren & Nils & Bohlin	Research Equipment Co., Wheaton, Ill	Feb. 13, 1958

2,812,232	Prevention of scale formation in uranium extractor.	J. W. Delaplaine	Catalytic Construction Co. of Canada, Ltd., and Eldorado Mining & Refining, Ltd., Philadelphia, Pa.	June 18, 1954
2,816,476	High speed camera	Wm. C. Davis & B. T. Rogers, Jr	Technol, Inc., Arlington, Mass	June 2, 1958
2,817,060	Nondestructive flaw detection apparatus	M. J. Sateman et al	Edrand Industries, Inc., Seattle, Wash	Sept. 18, 1958
2,817,350	Method and device for control of oxygen partial pressure.	H. Bradner et al	do	Do.
2,819,053	Acceleration integrator	K. E. Pope	Kenneth E. Pope, Albuquerque, N. Mex	Jan. 7, 1958
2,820,895	Pulse height analyzer	C. W. Johnstone	Globe Industries, Inc., Dayton, Ohio	Feb. 3, 1958
			Denver Research Institute, Denver, Colo	June 18, 1953
			Radiation Instrument Development Laboratory, Chicago, Ill.	Sept. 23, 1953
			Preston W. Byington, Los Alamos, N. Mex	Jan. 12, 1955
2,822,472	Negative gate generator	W. R. Aiken	Remington Rand Univac, Philadelphia, Pa	July 16, 1958
2,822,473	Pulse duration lengthener	do	do	Do.
2,824,365	Soldering of alumium base metals	G. F. Erickson	Crystal Manufacturing Co., Victorville, Calif	July 23, 1958
2,825,818	Gas phototube	J. H. Richardson	Remington Rand Univac, Philadelphia, Pa	July 16, 1958
2,827,569	Stabilized oscillator	H. F. Price	do	Do.
2,829,408	Centrifugal casting machine	A. B. Shuck	National Lead Co., New York, N.Y	Nov. 5, 1958
2,830,894	Production of uranium	Spedding, Wilhelm & Keller	do	Do.
2,830,921	Production of uranium tubing	E. C. Cruetz	do	Do.
2,832,113	Ingot mold	A. J. Mangold	do	Do.
2,834,672	Method producing uranium	Foster & Magel	do	Do.
2,835,890	Directional antenna	B. J. Bittner	Gulton Industries, Inc., Metuchen, N.J	Jan. 23, 1958
2,837,640	Pulse-height analyzer	W. W. Goldsworthy	University of California, Berkeley, Calif	June 7, 1954
			John L. Mero, Berkeley, Calif	Jan. 14, 1958
2,839,619	Amplifier	C. W. Johnstone	Preston W. Byington, Los Alamos, N. Mex	Jan. 12, 1955
2,846,084	Electronic master slave manipulator	Goertz & Thompson & Olsen	Borg-Warner Corp., Chicago, Ill	Aug. 15, 1956
2,848,352	Fuel elements and method of making	Noland & Marzano	MSA Research Corp., Callery, Pa	Oct. 22, 1957
2,848,625	Improved gamma and X-ray dosimetric method	Taplin, Douglas & Sigoloff	R–C Scientific Instrument Co., Inc., Playa del Rey, Calif	Dec. 8, 1953
			J. Hutner, Los Angeles, Calif	July 20, 1955
			Sanford C. Sigoloff, Beverley, Calif	Oct. 4, 1956

SCHEDULE B

[Explanation of symbols in "Type of license" column: B=Nonexclusive, irrevocable, royalty-free license for specific or general purposes. C=Sole license, with sole right to grant sublicenses, for specific nonatomic energy purposes or for purposes other than use in the production of special nuclear material or atomic energy]

Patent No.	Subject matter	Inventors	Contractor and address	Date of license	Type of license
2,431,732	Locating and welding fixture	E. Colbert	Crane Co., Chicago, Ill	Mar. 20, 1946	B
2,431,915	Bridge unbalance indicating means	R. D. Burchfield	Westinghouse, Pittsburgh, Pa	Nov. 7, 1946	C
2,437,458	Inspection periscope	G. S. Crampton	Lenox Instruments, Philadelphia, Pa	Aug. 8, 1945	C
2,437,849	Pump	J. H. Cox, A. P. Colaiaco, and H. A. Rose.	Westinghouse, Pittsburgh, Pa	Nov. 24, 1944	C
2,437,897	do	G. R. Stoltenberg, A. P. Colaiaco	do	Jan. 16, 1945	C
2,438,387	do	A. P. Colaiaco	do	June 18, 1946	C
2,438,395	do	D. L. Hopper	do	Oct. 30, 1944	C
2,441,042	Calibrating means for pitot venturi tubes	H. W. Stoll	Taylor Instrument, Rochester, N.Y	Feb. 20, 1948	B
2,441,044	Switching and timing unit for pneumatic relays	K. L. Tate	do	do	B
2,442,625	Packless valve	J. B. Thomas	M. W. Kellogg Co., New York, N.Y	Jan. 26, 1944	B
2,446,385	Adjusting arrangement for pneumatic relays of the force-balance type.	F. B. Newell	Taylor Instrument, Rochester, N.Y	June 2, 1947	B
2,455,591	Insulation cutting tool	W. S. Lindsay	Watson Flag Engineering, New York, N.Y	Nov. 8, 1944	C
2,456,133	Pump for gaseous working fluids	R. Lipscomb	United Kingdom Government	Dec. 23, 1957	B
2,465,018	Valve	W. C. Hein, L. W. Winchester	Crane Co., Chicago, Ill	Mar. 20, 1946	B
2,466,077	Limit switch	G. C. Biggs	Westinghouse, Pittsburgh, Pa	July 10, 1945	C
2,466,118	Precipitation of ammonium diuranate	A. J. Miller, G. M. Armstrong	Tennessee Eastman Corp., Oak Ridge, Tenn	July 31, 1947	B
2,472,645	Thermal conductivity analysis of gases	W. J. Clark	United Kingdom Government	Dec. 23, 1957	B
2,473,911	Production of fluorocarbons	N. F. Sarsfield	do	do	B
2,476,249	Remote-control manipulator	J. H. Payne, Jr	General Electric, Schenectady, N.Y	Jan. 25, 1949	B
2,476,490	Production of trifluoro acetic acid	W. N. Haworth, M. Stacey	United Kingdom Government	Sept. 17, 1957	B
2,478,666	Production of fluorine containing hydrocarbon derivatives.	N. F. Sarsfield	do	Dec. 23, 1957	B
2,480,467	Production of trifluoro acetic acid compounds	W. N. Haworth, M. Stacey	do	Sept. 17, 1957	B
2,483,610	Bladed impeller for turboblowers	K. Baumann	do	do	B
2,484,519	Method of coating surfaces with boron	G. R. Martin	do	May 2, 1958	B
2,486,976	Pressure measuring device	W. R. Perret	Tennessee Eastman Corp., Oak Ridge, Tenn	July 16, 1946	B
2,489,028	Positive shutoff dispensing nozzle	V. D. Carver, C. B. Graham	do	Aug. 1, 1946	B
2,489,058	Diffusion pump	G. R. Stoltenberg	Westinghouse, Pittsburgh, Pa	June 21, 1944	C
2,491,688	Method of connecting sheaths enclosing electrical elements.	G. W. Pickels IV	do	May 2, 1945	C
2,492,365	Dispensing nozzle	O. E. Miller	Tennessee Eastman Corp., Oak Ridge, Tenn	Aug. 8, 1946	B
2,495,081	Packless valve	J. B. Thomas	M. W. Kellogg Co., New York, N.Y	Feb. 14, 1944	B
2,499,622	Electric switch with magnetic biasing	B. P. Baker, R. C. Van Sickle & R. G. Shriver.	Westinghouse, Pittsburgh, Pa	Aug. 1, 1946	C
2,499,645	Pump	D. H. Hopper	do	June 21, 1946	C
2,499,839	High-speed mercury diffusion pump	G. R. Stoltenberg	M. W. Kellogg Co., New York, N.Y	Sept. 9, 1947	B

2,501,461	Valve	H. E. Wirth	Ohio State Research Institute, Columbus, Ohio	July 23, 1945	B
2,504,530	Vacuum leak detector method	R. B. Jacobs	M. W. Kellogg Co., New York, N.Y.	Sept. 24, 1947	B
2,506,431	Pressure measuring device	W. R. Perret, T. Davis	Tennessee Eastman Corp., Oak Ridge, Tenn	Feb. 5, 1945	B
2,506,944	Neutron meter	L. H. Stauffer, T. M. Snyder	General Electric, Schenectady, N.Y	Dec. 14, 1949	B
2,513,114	Liquid air trap	D. W. Smith	Westinghouse, Pittsburgh, Pa	Nov. 8, 1944	C
2,510,930	System for measuring limited current changes	K. G. MacLeish	Tennessee Eastman Corp., Oak Ridge, Tenn	Aug. 14, 1945	B
2,514,135	Radiation detector	H. G. Neil	do	Feb. 18, 1949	B
2,514,142	Hydraulically driven oscillatory brush	J. D. Reid	do	Dec. 26, 1944	B
2,515,159	Quick operating valve	E. Zurcher	do	Aug. 1, 1946	B
2,521,634	Acoustic chamber for analysis of gaseous mixtures.	W. H. Janssen, W. Mikelson	General Electric, Schenectady, N.Y	Apr. 14, 1947	B
2,526,825	Fluid selecting apparatus	A. O. C. Nier, G. H. Goertzel & R. B. Thorness.	M. W. Kellogg Co., New York, N.Y	July 19, 1945	B
2,530,178	Fluxmeter	W. R. Rathkamp	Tennessee Eastman Corp., Oak Ridge, Tenn	May 14, 1948	B
2,531,065	Apparatus for changing the ion source of a cyclotron.	J. J. Livingood, R. A. Streeter, J. V. Peters.	Collins Radio, Cedar Rapids, Iowa	Dec. 27, 1950	B
2,531,183	Means for grounding cables	R. R. Wisner	Stone & Webster Engineering Corp., Boston, Mass	Dec. 19, 1944	C
2,531,811	Coulombmeter	J. E. Hammel	Tennessee Eastman Corp., Oak Ridge, Tenn	July 13, 1948	B
2,533,491	Valve control mechanism	J. B. McMahon, T. A. Abbott	M. W. Kellogg Co., New York, N.Y	Jan. 7, 1947	B
2,535,180	Method of molding hollow articles from refractory materials under heat and pressure.	G. R. Watson	Norton Co., Worcester, Mass	Feb. 3, 1950	C
2,535,202	Indicating, recording, and controlling apparatus.	C. H. Gregory, J. Hall	United Kingdom Government	Sept. 25, 1957	B
2,537,775	Ion vacuum gage	S. M. MacNeille	Tennessee Eastman Corp., Oak Ridge, Tenn	Dec. 26, 1944	B
2,538,959	Process for molding refractory oxides	A. H. Ballard	Norton Co., Worcester, Mass	Feb. 3, 1950	C
2,539,273	Alternating current moderator	W. L. Ringland	Allis Chalmers Co., Milwaukee, Wis	Nov. 9, 1945	B
2,540,941	Latch mechanism	V. D. Carver, C. B. Graham	Tennessee Eastman Corp., Oak Ridge, Tenn	Aug. 1, 1946	B
2,541,198	Amplifier	I. R. Brenholdt	M. W. Kellogg Co., New York, N.Y	Apr. 12, 1948	B
2,548,423	Electric heating		Westinghouse, Pittsburgh, Pa	Oct. 24, 1946	C
2,551,541	Vacuum pumping method with mechanical oil-sealed pumps.	F. A. Knox	Tennessee Eastman Corp., Oak Ridge, Tenn	Sept. 8, 1948	B
2,552,032	The separation of phosphorous	A. H. Booth	Government of Canada	Mar. 13, 1957	B
2,554,792	Pressure measuring device	W. R. Perret	Tennessee Eastman Corp., Oak Ridge, Tenn	Sept. 8, 1948	B
2,558,698	Electromagnetic pump	E. J. Wade	General Electric, Schenectady, N.Y	May 8, 1950	B
2,567,956	High-pressure polymerization of perhaloolefins	W. T. Miller	Columbia University, New York, N.Y	Oct. 24, 1956	B
2,570,119	Recovery of carnotite from its ores	R. W. Handley, C. W. Sawyer	Union Mines Development Co., New York, N.Y	Apr. 20, 1949	B
2,570,120	Process for recovery of pitchblende and similar uranium minerals from ores of same by special flotation practice.	do	do	do	B
2,573,639	Manufacture of porous articles from trifluorochloroethylene polymer.	M. A. Coler	Markite Co., New York, N.Y	Dec. 1, 1949	B
2,575,775	Diaphragm valve	W. O. Teeters	Hoke, Inc., New York, N.Y	May 22, 1945	C
2,577,066	Pressure measuring device	W. A. Arnold	Tennessee Eastman Corp., Oak Ridge, Tenn	Mar. 12, 1947	B
2,577,696	Electric positioning-proportional floating control.	T. A. Abbot, J. B. McMahon	M. W. Kellogg Co., New York, N.Y	June 13, 1946	B
2,580,358	Method for storing perhaloacetyl peroxide and stabilized perhaloacetyl peroxide.	W. T. Miller, A. L. Dittman, S. K. Reed.	Columbia University, New York, N.Y	Oct. 24, 1956	B
2,581,862	Insulation	J. S. Johnson, E. L. Schulman	Westinghouse, Pittsburgh, Pa	Oct. 9, 1944	C
2,582,163	Electrometer for pocket chambers	T. A. Rich, J. E. Bigelow	General Electric, Schenectady, N.Y	June 17, 1949	B
2,586,550	Halogen-substituted acetyl peroxide catalyst for halo-olefin polymerization.	W. T. Miller, A. L. Dittman	Columbia University, New York, N.Y	Oct. 24, 1956	B

SCHEDULE B—Continued

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Patent No.	Subject matter	Inventors	Contractor and address	Date of license	Type of license
2,586,984	Apparatus for governing fluid flow	A. O. C. Nier, R. B. Thorness, C. M. Stevens.	M. W. Kellogg Co., New York, N.Y.	Aug. 10, 1945	B
2,592,416	Indicating device for radioactivity intensity	E. J. Groth, Jr.	Tennessee Eastman Corp., Oak Ridge, Tenn.	Aug. 12, 1947	B
2,594,668	Flowmeter	C. Mannal	General Electric, Schenectady, N.Y.	Mar. 27, 1950	B
2,597,296	Insulator bushing seal	J. D. Reid	Tennessee Eastman Corp.	Jan. 11, 1945	B
2,598,283	Copolymers of perfluoropropene and method of making same.	W. T. Miller	Carbide & Carbon, Oak Ridge, Tenn.	Oct. 24, 1956	B
2,598,411	Rearrangement of saturated halocarbons	W. T. Miller, E. W. Fager	do	do	B
2,599,156	Thermal neutron detector element	H. W. Bousman	General Electric, Schenectady, N.Y.	Jan. 11, 1950	B
2,600,891	Vacuum system leak detector	S. M. MacNeille	Tennessee Eastman Corp., Oak Ridge, Tenn.	Aug. 1, 1946	B
2,600,936	Method and apparatus for measuring low-pressures and related conditions.	W. G. Stone	do	June 25, 1945	B
		H. G. Neil	do	Dec. 26, 1944	B
2,604,514	Ionization gauge regulation	O. B. Rudolph	do	Oct. 21, 1946	B
2,604,612	Control circuit	A. Kirkpatrick, H. H. McMeen	Stone & Webster Engineering Corp., Boston, Mass.	May 28, 1947	C
2,605,816	Deaerating system for water or steam condensate.				
2,607,024	Automatic arc starting device	E. M. Marwell, R. L. Kenngott	Burns & Roe, New York, N.Y.	Nov. 5, 1951	C
2,608,855	Method and apparatus for measuring tightness of vessels.	R. B. Jacobs	M. W. Kellogg, New York, N.Y.	Apr. 17, 1946	B
2,610,104	Precipitation of zirconium hydroxide in a readily filterable form.	H. H. Friedel	Brush Beryllium Cleveland, Ohio	Feb. 4, 1952	C
2,610,303	Coincidence circuit	R. E. Bell	Government of Canada	Mar. 27, 1957	B
2,613,231	Diffusion measuring meter	C. G. Bacon	Tennessee Eastman Corp., Oak Ridge, Tenn.	Dec. 26, 1944	B
2,615,249	Atomic air burst direction finder	G. A. Allard	General Electric, Schenectady, N.Y.	Jan. 2, 1952	B
2,616,042	Stabilizer arrangement for cyclotrons and the like.	R. R. Weeks	Collins Radio, Cedar Rapids, Iowa.	July 17, 1950	B
2,617,526	Apparatus for sorting radioactive ore	C. M. Lapointe	Government of Canada	Jan. 8, 1957	B
2,617,973	Regulating system	J. L. Wolff, Jr., D. F. Aldrich	Westinghouse, Pittsburgh, Pa.	June 25, 1951	C
2,617,850	Sealed insulator bushing	H. Carmichael	United Kingdom Government	May 2, 1958	B
2,619,107	Fluid flow control system	C. B. Graham	Tennessee Eastman Corp., Oak Ridge, Tenn.	July 24, 1946	B
2,619,601	Radioactivity survey apparatus	S. M. Zollers	Radio Corp. of America, Princeton, N.J.	Dec. 18, 1950	B
2,619,609	Adjustable electrode support	J. D. Reid	Tennessee Eastman Corp., Oak Ridge, Tenn.	Oct. 21, 1946	B
2,621,110	Recovery of radioactive phosphorous from neutron irradiated sulfur.	J. G. MacHutchin, LaV. C. Watson	Government of Canada	Mar. 13, 1957	B
2,624,564	Balance	H. Carmichael	United Kingdom Government	May 2, 1958	B
2,626,203	Method of making zirconium tetrachloride	W. B. Blumenthal	National Lead Co., New York, N.Y.	Feb. 25, 1952	B
2,626,359	Target for particle accelerators	F. R. Weber, Jr.	North American Aviation, Los Angeles, Calif.	Dec. 23, 1951	B
2,628,892	Apparatus for fractional sublimation	A. F. Reid	Columbia University, New York, N.Y.	June 2, 1950	B
2,632,103	Stabilized pulse circuit	M. W. Horrell	Bendix Aviation Corp., Detroit, Mich.	Sept. 20, 1950	B
2,633,539	Device for separating particles of different masses.	W. Altar	Westinghouse, Pittsburgh, Pa.	Mar. 3, 1952	B

2,637,297	Apparatus for attaching filaments to electrodes in machines for coating with metal vapors.	Z. M. Shapiro	do	Oct. 6, 1952	B
2,637,298	do	do	do	do	B
2,639,974	Method of separating uranium from its ores	A. H. A. Ross, R. H. Farmer, A. G. W. Lamont.	Government of Canada	Feb. 19, 1957	B
2,643,341	Mass spectrometer ion source	W. T. Leland	M. W. Kellogg Co., New York, N.Y.	Feb. 25, 1948	B
2,644,913	Surge suppressor	W. G. Stone	Tennessee Eastman Corp., Oak Ridge, Tenn	Aug. 2, 1949	B
2,646,925	Electrical integrator	M. Bevis	do	June 27, 1946	B
2,648,348	Incineration system	S. Robinson	Stone & Webster Engineering Corp., Boston, Mass.	Apr. 7, 1947	C
2,650,085	Apparatus for the purification of calcium	R. Le G. Burnett	U.K. Government	Jan. 2, 1958	B
2,650,153	Process for the production of ammonium uranium fluoride.	A. S. Ellis, R. B. Mooney	do	Dec. 31, 1957	B
2,652,188	Automatic tank pump down	R. R. Cyr	Tennessee Eastman Corp., Oak Ridge, Tenn	June 3, 1948	B
2,652,510	Gas discharge device	L. R. Landrey, A. Mazzei	Sylvania Electric Products, New York, N.Y.	July 9, 1952	B
2,652,778	Electromagnetic centrifugal pump	F. E. Crever	General Electric, Schenectady, N.Y.	Sept. 21, 1949	B
2,653,856	Preparation of beryllium fluoride	G. Barr	U.K. Government	Jan. 14, 1958	B
2,654,654	Process for the production of uranium tetrafluoride.	A. S. Leah, R. B. Mooney	do	Dec. 31, 1957	B
2,659,589	Integrating accelerometer	C. N. Hickman	Western Electric, New York, N.Y.	Dec. 17, 1952	B
2,660,677	Ion selector	A. O. C. Nier	M. W. Kellogg Co., New York, N.Y.	Apr. 6, 1948	B
2,662,072	Process for copolymerizing CF_2-CF_2 with CF_2=CF CL.	W. T. Miller	do	Oct. 24, 1956	B
2,664,449	Pyrolysis of trifluorochloroethylene polymers	do	do	do	B
2,665,384	Ion accelerating and focusing system	H. P. Yockey	Tennessee Eastman Corp.	July 24, 1950	B
2,665,970	Precipitation of vanadium oxides	J. Halpern, F. A. Forward	Government of Canada	Mar. 13, 1957	B
2,667,474	Heat treatment of polytrifluorochloroethylene plastic.	W. T. Miller	M. W. Kellogg Co., New York, N.Y.	Oct. 24, 1956	B
2,668,182	Polyunsaturated fluoroolefins	do	do	do	C
2,668,272	Voltage regulator	E. J. Groth, Jr.	Tennessee Eastman Corp., Oak Ridge, Tenn	July 24, 1946	B
2,668,794	Distillation system for recovering spent pumping oils.	R. J. Schmidt	do	Apr. 12, 1946	B
2,673,294	Discriminator circuit	W. J. Battell, N. F. Moody	Government of Canada	Mar. 27, 1957	B
2,674,698	Beam defining apparatus	J. L. Danforth, L. R. McIntosh	High Voltage Engineering Corp., Cambridge, Mass.	Oct. 22, 1952	B
2,676,875	Catalytic apparatus for isotopic exchange	F. T. Barr	Standard Oil Development Co., Linden, N.J.	May 7, 1943	B
2,677,773	Electroscope	H. Carmichael, P. G. Salmon	Government of Canada	Apr. 10, 1957	B
2,678,949	Method for producing alkyl substituted amine borines.	M. D. Banus, T. R. P Gibb, Jr., R. W. Bragdon.	Metal Hydrides, Inc., Beverly, Mass.	Feb. 25, 1952	C
2,679,978	Pulse scaling systems	K. Kandish	U.K. Government	July 10, 1958	B
2,680,071	Low-melting alloy	L. F. Epstein, W. H. Howland, and M. D. Powers.	General Electric, Schenectady, N.Y.	Sept. 25, 1951	B
2,682,453	Mixer-settler contact apparatus	C. H. Holder, C. G. Nelson, R. C. Morbeck.	Standard Oil Development Co., Linden, N.J.	June 23, 1952	C
2,683,806	Discriminator circuit	N. F. Moody	Government of Canada	Mar. 27, 1957	B
2,684,898	Distillation of calcium	J. Barton	U.K. Government	Jan. 2, 1958	B
2,685,670	Speed regulating circuit for generators	M. W. Horrell	Bendix Aviation Corp., Detroit, Mich.	Sept. 26, 1950	B
2,686,474	Electromagnetic pump	O. O. Pulley	U.K. Government	Dec. 31, 1958	B
2,687,340	Production of an alkali metal double fluoride of zirconium or hafnium.	E. Wainer	Horizons, Inc., Cleveland, Ohio	Mar. 15, 1954	B
2,687,995	Electrolytic production of uranium tetrafluoride.	E. Lofthouse	U.K. Government	Jan. 2, 1958	B
2,688,529	Method of preparing uranium tetrachloride	E. L. Wagner, L. B. Dean	Tennessee Eastman Corp., Oak Ridge, Tenn	Nov. 22, 1949	B
2,688,530	do	E. L. Wagner, B. M. Pitt	do	June 24, 1949	B

SCHEDULE B—Continued

[Explanation of symbols in "Type of license" column: B=Nonexclusive, irrevocable, royalty-free license for specific or general purposes. C=Sole license with sole right to grant sublicenses, for specific nonatomic energy purposes or for purposes other than use in the production of special nuclear material or atomic energy]

Patent No.	Subject matter	Inventors	Contractor and address	Date of license	Type of license
2,689,165	Process for producing uranium tetrafluoride	B. G. Harvey	U.K. Government	Jan. 2, 1958	B
2,689,629	Reduction of the momentum of falling bodies	J. W. Kendall, I. H. Morrison	do	Sept. 25, 1957	B
2,690,468	Drill hole logging probe	H. Faul, R. J. Smith	Union Mines Development Co., New York, N.Y.	July 2, 1947	B
2,693,700	Pressure ascertaining means	C. V. Osborne	Western Electric, New York, N.Y.	Apr. 23, 1954	B
2,695,268	Process for the concentration of isotopes	C. A. H. Wright	Government of Canada	Jan. 20, 1945	B
2,698,383	Electronic Counter	N. F. Moody	do	Mar. 27, 1957	B
2,700,107	Ion source	J. S. Luce	Tennessee Eastman Corp., Oak Ridge, Tenn.	Jan. 9, 1950	B
2,691,100	Electronic counter	N. F. Moody	Government of Canada	Mar. 27, 1957	B
2,703,337	Insulator clamping device	W. L. Scott, Jr.	Tennessee Eastman Corp., Oak Ridge, Tenn.	June 25, 1945	B
2,703,366	Timing of shock waves	J. L. Tuck	U.K. Government	Jan. 4, 1958	B
2,704,330	Voltage stabilized oscillator	T. F. Marker	Western Electric, New York, N.Y.	Feb. 8, 1954	B
2,707,482	Electronic liquid level controller	R. E. Carter	North American Aviation, Los Angeles, Calif.	Feb. 27, 1956	C
2,707,964	Measurement and control of the compositions of flowing streams of fluid mixtures.	P. S. Monroe	M. W. Kellogg Co., New York, N.Y.	Sept. 6, 1950	B
2,708,148	Camera timer	M. R. Clark	Bendix Aviation, Detroit, Mich.	Mar. 31, 1952	B
2,708,618	Purification of ammonium beryllium fluoride solutions.	C. W. Schwenzfeier, Jr.	Brush Beryllium, Cleveland, Ohio	Apr. 20, 1953	C
2,709,842	Production of metals	G. R. Findley	National Research Corp., Cambridge, Mass.	July 25, 1951	C
2,710,538	Electromagnetic pressure gage	L. B. Vandenberg	General Electric, Schenectady, N.Y.	Jan. 30, 1953	B
2,711,361	Process for the recovery of uranium	G. O. Morris	U.K. Government	Jan. 2, 1958	B
2,712,073	Temperature control	E. V. Martin	Tennessee Eastman Corp., Oak Ridge, Tenn.	Dec. 26, 1944	B
2,712,074	Electrical control circuit	H. G. Neil	do	Jan. 11, 1945	B
2,712,075	Automatic emission control circuit	M. Bevis	do	do	B
2,712,076	Isotope separating apparatus	R. C. Van Sickle	Westinghouse, Pittsburgh, Pa.	July 24, 1946	C
2,712,223	Cyclotron target box cooler	C. D'A. Hunt, H. P. Yockey	North American Aviation, Los Angeles, Calif.	Mar. 19, 1952	C
2,712,636	Short circuit eliminator	J. W. Litton, R. F. Krueger	Tennessee Eastman Corp., Oak Ridge, Tenn.	July 24, 1946	B
2,712,979	Method for reducing pyrophoricity of uranium hydride powder.	T. R. P. Gibb, Jr., W. H. Pasfield	Metal Hydrides, Inc., Beverly, Mass.	Feb. 25, 1952	C
2,713,093	Switch mechanism	W. A. Joerndt, J. J. Kane	Western Electric, New York, N.Y.	Sept. 28, 1954	B
2,713,097	Accelerometer	A. D. Wooten	do	Nov. 9, 1953	B
2,713,266	Differential altimeter	R. E. Smith, J. M. Wurth, R. B. Horsfall, Jr., S. J. Goldberg and T. N. Leine.	North American Aviation, Los Angeles, Calif.	Nov. 28, 1950	C
2,713,640	Electron control apparatus	H. W. Savage	Tennessee Eastman Corp., Oak Ridge, Tenn.	July 3, 1945	B
2,713,677	Method and apparatus for discriminating frequency modulated records.	J. H. Scott, J. W. Valentine, W. Gross.	Western Electric, New York, N.Y.	Sept. 8, 1954	B
2,714,165	Isotope separating apparatus	J. D. Reid	Tennessee Eastman Corp., Oak Ridge, Tenn.	May 28, 1946	B
2,714,166	Calutron structure	C. Starr	do	Sept. 17, 1947	B
2,714,665	Isotope separating apparatus	W. C. Tunnell	do	Apr. 26, 1945	B
2,715,181	Pulse height analyzer	W. E. Glenn, Jr., A. E. Larsh, Jr.	General Electric, Schenectady, N.Y.	Nov. 12, 1952	B
2,715,185	Automatic control system	C. W. Roeschke	Western Electric, New York, N.Y.	Dec. 17, 1952	B

		H. H. Hull, S. M. MacNeille	Tennessee Eastman Corp., Oak Ridge, Tenn.	Sept. 3, 1946	B
			do	Jan. 14, 1946	B

2,715,186	Isotope separating apparatus	H. H. Hull, S. M. MacNeille	Tennessee Eastman Corp., Oak Ridge, Tenn	Sept. 3, 1946	B
2,715,196	Electron emitter	J. D. Reid	do	Jan. 14, 1946	B
2,715,692	Ion producing apparatus	A. B. Cardwell	do	Aug. 23, 1946	B
2,715,693	Deep collimating slot	S. M. MacNeille, K. R. MacKenzie	do	May 5, 1947	B
2,715,694	Ion producing apparatus	H. P. Yockey	do	Mar. 10, 1947	B
2,716,211	Thyratron trigger circuit for discharging a capacitor.	E. A. Aas	Western Electric, New York, N. Y	July 31, 1953	B
2,716,943	Liquid metal high pressure pump	L. B. Vandenberg	General Electric, Schenectady, N.Y	Jan. 30, 1953	B
2,717,225	Sintered refractory mass	A. E. Williams	United Kingdom Government	Sept. 20, 1957	B
2,717,915	Apparatus for production of purified metals	Z. M. Shapiro	Westinghouse, Pittsburgh, Pa	Mar. 23, 1953	B
2,717,964	Sulfur crystal counter	V. L. Parsegian, R. C. Maninger	M. W. Kellogg Co., New York, N.Y	Feb. 23, 1954	B
2,718,235	Valve device for isotope separating apparatus	P. J. Galbreath, W. C. Tunnell	do	Apr. 14, 1945	B
2,719,843	Method of synthesizing nucleosides and analogous compounds and compounds prepared thereby.	J. Davoll, G. B. Brown	Sloan-Kettering Institute for Cancer Research, New York, N.Y.	Oct. 29, 1951	B
2,720,105	Radiation shield block	J. O. Billups	North American Aviation, Los Angeles, Calif	Apr. 3, 1951	B
2,721,273	Magnet	L. O. Waite	Stone & Webster Engineering Corp., Boston, Mass	Apr. 8, 1946	C
2,725,028	Combined adjusting and indicating means	H. H. Obergfell	Western Electric, New York, N.Y	Nov. 9, 1953	B
2,725,288	Process and apparatus for fabricating metallic articles.	H. W. Dodds, C. B. Sawyer	Brush Beryllium, Cleveland, Ohio	Aug. 15, 1952	C
2,727,806	Preciptation of uranium from alkali metal carbonate solutions.	F. A. Forward, J. Halpern	Government of Canada	Mar. 13, 1957	B
2,727,995	Leak detector	R. Loevinger, T. A. Chubb, G. W. Monk.	University of California and Tennessee Eastman Corp.	July 18, 1946	B
2,728,220	Vibration measuring apparatus	M. J. Willner	Western Electric, New York, N.Y	Sept. 10, 1953	B
2,728,633	Production of uranium and thorium compounds.	T. V. Arden, F. H. Burstall, R. P. Linstead & R. A. Wells.	United Kingdom Government	Sept. 27, 1957	B
2,729,815	Sweep circuit	G. B. Andrews, R. L. DeVoll, W. X. Lamb, Jr.	Bendix Aviation, Detroit, Mich	Nov. 7, 1951	B
2,732,807	Diaphragm pump	V. L. Parsegian	Vitro Corp., New York, N.Y	Oct. 25, 1951	B
2,733,128	Process for the recovery of U in the presence of iron.	A. E. Ballard	Tennessee Eastman Corp., Oak Ridge, Tenn	Aug. 14, 1945	B
2,733,200	Recovery of uranium values from phosphoric acid.	R. Kunin	Rohm & Haas, Philadelphia, Pa	May 12, 1954	C
2,736,806	Blocking oscillator	J. C. Miller	Western Electric, New York, N.Y	July 31, 1953	B
2,736,809	Ion generator and projector	C. G. Bacon	Tennessee Eastman Corp., Oak Ridge, Tenn	June 25, 1945	B
2,738,253	Uranium separation process	A. Thunaes, E. A. Brown, H. W. Smith & J. Brannen.	Government of Canada	Feb. 19, 1957	B
2,738,369	Method for making quaternary ammonium borohydrides.	M. D. Banus, T. R. P. Gibb & R. W. Bragdon.	Metal Hydrides, Beverly, Mass	May 31, 1951	C
2,739,566	Apparatus for the production of coatings of purified metals.	Z. M. Shapiro, J. McDonald	Westinghouse, Pittsburgh, Pa	Oct. 24, 1955	B
2,739,934	Electrolytic purification of uranium	R. Kunin	Rohm & Haas, Philadelphia, Pa	Apr. 28, 1954	C
2,741,589	Recovery of uranium	do	do	Mar. 9, 1953	C
2,741,590	Electrolytic recovery of manganese	do	do	do	C
2,742,085	Timing apparatus	A. E. Bennett, J. C. H. Gelsow	United Kingdom Government	Sept. 30, 1957	B
2,742,348	Fluid contactor apparatus	R. Spence, R. J. W. Streeton	do	Sept. 25, 1957	B
2,742,577	Quartz fiber electroscopes	R. P. Henderson	do	Dec. 31, 1957	B
2,742,587	Demountable filament assembly	W. J. Armstrong, P. I. Corbell, K. H McPhee.	Collins Radio, Cedar Rapids, Iowa	July 2, 1953	B
2,743,154	Method of recovery of uranium by a resin-in-pulp process.	D. Kaufman, G. W. Lower	American Cyanamid, New York, N.Y	July 26, 1954	B

SCHEDULE B—Continued

[Explanation of symbols in "Type of license" column: B=Nonexclusive, irrevocable, royalty-free license for specific or general purposes. C=Sole license, with sole right to grant sublicenses, for specific nonatomic energy purposes or for purposes other than use in the production of special nuclear material or atomic energy]

Patent No.	Subject matter	Inventors	Contractor and address	Date of license	Type of license
2,743,155	Method of preparing the double halide salts of thorium and alkali metals.	S. Z. Cardon	Horizons, Inc., Cleveland, Ohio	Oct. 29, 1953	B
2,743,160	Preparation of alkali metal double fluorides of zirconium and hafnium.	E. Wainer	do	Mar. 15, 1954	C
2,743,162	do	do	do	do	C
2,743,168	Sublimation apparatus	R. Krohn, R. J. Schmidt	Tennessee Eastman Corp., Oak Ridge, Tenn	June 21, 1944	B
2,743,169	Horizontal sublimation apparatus	J. C. Hecker	do	Dec. 26, 1944	B
2,743,222	Electrolytic process for recovering uranium compounds from carbonate leach liquors.	G. W. Clevenger	American Cyanamid, New York, N.Y	June 19, 1953	B
2,745,985	Pulse amplitude analysers	I. A. D. Lewis	United Kingdom Government	Dec. 31, 1957	B
2,748,710	Heat-exchanger pump	L. B. Vandenberg	General Electric, Schenectady, N.Y	Apr. 8, 1955	B
2,752,508	Counting-rate meter	G. V. Zito	Bendix Aviation, Detroit, Mich	Jan. 8, 1951	B
2,753,476	Current transfer systems	D. A. Watt	United Kingdom Government	Sept. 30, 1957	B
2,754,347	Apparatus for refining rare refractory metals	D. Wroughton, J. W. Marden	Westinghouse	May 9, 1944	C
2,754,993	Vessel head reinforcing ring and method of prestressing.	F. L. Maker	California Research & Development Corp., San Francisco, Calif.	Jan. 12, 1954	C
2,756,122	Process for recovering uranium and vanadium from ores.	D. C. McLean	American Cyanamid, New York, N.Y	Feb. 26, 1953	B
2,756,123	Uranium-vanadium recovery and purification process.	R. H. Bailes, R. S. Long	Dow Chemical Co., Midland, Mich	July 12, 1950	B
2,756,124	Uranium chlorination process	J. L. Patterson, A. Bell	Tennessee Eastman Corp., Oak Ridge, Tenn	Feb. 6, 1947	B
2,756,644	Vacuum fixture	G. N. Steele	North American Aviation, Los Angeles, Calif	Feb. 9, 1954	C
2,756,930	Computing device	G. T. Pelsor, H. S. Sack	Western Electric, New York, N.Y	Jan. 26, 1955	B
2,757,072	Recovery of free and combined nitric acid from metal nitrate liquors.	N. M. Kapp, W. W. Weinrich	Catalytic Construction Co., Philadelphia, Pa	Nov. 8, 1953	B
2,758,007	Ether extraction of uranium salt from solution	A. E. Ballard	Tennessee Eastman Corp., Oak Ridge, Tenn	Oct. 12, 1948	B
2,759,792	Separating hafnium from zirconium	B. A. J. Lister, J. F. Duncan, J. M. Hutcheon.	United Kingdom Government	Sept. 25, 1957	B
2,759,793	do	B. A. J. Lister, J. F. Duncan	do	do	B
2,760,598	Gas sorbent and method of gas recovery and storage.	F. C. Dietz, R. C. Thorburn	California Research & Development Corp., San Francisco, Calif.	Feb. 2, 1955	C
2,761,758	Process for recovery of uranium	R. S. Long, R. H. Bailes, E. S. DeHaven.	Dow Chemical Co., Midland, Mich	Dec. 6, 1951	B
2,763,371	Ore dressing process	I. M. LeBaron	Int. Minerals & Chemical Corp., Skokie, Ill	Apr. 11, 1953	C
2,766,442	Leak detection apparatus	W. H. Meyer, Jr	Westinghouse, Pittsburgh, Pa	Nov. 12, 1953	B
2,767,045	Treatment of phosphate rock to recover phosphorus and uranium values.	R. F. McCullough	Int. Minerals & Chemical Corp., Skokie, Ill	Apr. 11, 1953	C
2,767,046	Method of solubilizing and recovering metal values by means of ammonium acid sulfate.	R. J. Piros, Jr	do	Mar. 5, 1956	C
2,768,059	Process for recovery of uranium and the upgrading of alkali-uranium fluoride precipitates.	R. H. Bailes, R. O. Lindblom, R. R. Grinstead.	Dow Chemical Co., Midland, Mich	Nov. 20, 1953	B

2,769,686	Recovery of mineral values from leached zone material overlying Florida pebble phosphate deposits.	R. F. McCullough, I. M. LeBaron	Int. Minerals & Chemical Corp., Skokie, Ill	Apr. 11, 1953	C
2,770,196	Electromagnetic interaction pump	D. A. Watt	United Kingdom Government	July 6, 1957	B
2,770,520	Recovery of uranium from phosphoric acid and phosphate solutions by ion exchange.	R. S. Long, R. H. Bailes	Dow Chemical Co., Midland, Mich	July 12, 1950	B
2,770,522	Method of purifying and recovering vanadium from phosphate-containing solutions.	R. H. Bailes, R. R. Grinstead	do	Aug. 22, 1952	B
2,770,781	Wave delaying structure for rectangular wave guides.	R. B. Robertson-Shersby-Harvie, J. Dain.	United Kingdom Government	Dec. 31, 1957	B
2,770,969	Fluid flow meter and controller	R. S. Cannell	California Research & Development Co., San Francisco, Calif.	Apr. 15, 1955	C
2,774,729	Recovery of uranium by electrolysis of a fused bath.	G. Meister	Westinghouse, Pittsburgh, Pa	Feb. 9, 1944	C
2,775,741	Phase shifting device	P. I. Corbell	Collins Radio, Cedar Rapids, Iowa	July 2, 1953	B
2,776,189	Nitric acid recovery and purification	F. W. Winn	Catalytic Construction Co., Philadelphia, Pa	Nov. 26, 1954	B
2,778,786	Coating a carbonaceous surface with rhenium	H. Pearlman, L. Silverman, C. A. Smith.	North American Aviation, Los Angeles, Calif	Apr. 20, 1954	C
2,779,657	Recovery of uranium from wash liquids	A. E. Ballard	Tennessee Eastman Corp., Oak Ridge, Tenn	Sept. 6, 1945	B
2,780,455	Combination of acceleration sensing and integrating means.	H. F. Devaney	Western Electric, New York, N.Y	Aug. 16, 1954	B
2,780,515	Method for improved precipitation of uranium peroxide.	A. J. Miller, B. M. Pitt, P. F. Grieger	Tennessee Eastman Corp., Oak Ridge, Tenn	Aug. 30, 1950	B
2,780,518	Process for recovery of uranium from aqueous solutions.	J. W. Gates, Jr., L. J. Andrews	do	July 24, 1946	B
2,783,320	Pressure switch	A. F. Fink	Western Electric, New York, N.Y	Oct. 30, 1956	B
2,788,656	Means for investigating gases	H. H. Sander	do	Dec. 21, 1954	B
2,789,038	Preparation of impervious graphite	G. A. Bennett, T. H. Inatomi, J. M. Fiskin.	North American Aviation, Los Angeles, Calif	Jan. 14, 1955	C
2,789,880	Selective chlorination of beryl	W. W. Beaver	Brush Beryllium, Cleveland, Ohio	Aug. 31, 1954	C
2,790,149	Dielectric-loaded wave guides	R. B. Robertson-Shersby-Harvie, L. B. Mullett.	United Kingdom Government	Dec. 31, 1957	B
2,790,702	Acid treatment of phosphate rock to recover phosphates and uranium.	R. F. McCullough	Int. Minerals & Chemical Corp	Mar. 5, 1956	C
2,792,377	Polytrifluorochloroethylene pastic	W. T. Miller	M. W. Kellogg, New York, NY	Oct. 24, 1956	B
2,794,241	Fabrication of intricate shapes from beryllium	H. W. Dodds, C. B. Sawyer	Brush Beryllium, Cleveland, Ohio	Dec. 16, 1952	C
2,794,923	Electromagnetic apparatus	S. W. Barnes	Tennessee Eastman Corp., Oak Ridge, Tenn	Feb. 7, 1946	B
2,797,050	Remote adjustment of automatic control system.	K. G. Macleish	do	Sept. 6, 1945	B
2,797,081	Carbon burner	F. J. Sullivan, J. H. Allen, E. J. Bair	do	Jan. 24, 1949	B
2,797,163	Method of making filter media	W. J. Smith, R. W. James	A. D. Little, Inc., Cambridge, Mass	Dec. 20, 1954	B
2,797,319	Trigger circuit	N. F. Moody	Government of Canada	Mar. 18, 1957	B
2,797,328	Transistor oscillator	E. G. Miller, Jr	Western Electric, New York, N.Y		
2,797,983	Method of determining small quantities of uranium compounds in a gas stream.	J. Greenspan, A. S. Carlson	M. W. Kellogg Co., New York N.Y	Apr. 14, 1947	B
2,798,036	Electroplating of beryllium	J. J. Utz	North American Aviation, Los Angeles, Calif	Mar. 4, 1957	C
2,798,359	Steam powerplant with means for heavy water concentration.	J. S. Foster, G. E. Haddeland	Government of Canada	Dec. 5, 1956	B
2,799,554	Method of separating plutonium	F. Morgan	U.K. Government	Apr. 1, 1957	B
2,799,555	do	do	do	do	B
2,803,405	Automatic counting apparatus	W. D. Howell	Government of Canada	Mar. 27, 1957	B
2,804,550	Automatic light control	M. Artzt	Radio Corp. of America, Princeton, N.J	Nov. 26, 1952	B

SCHEDULE B—Continued

[Explanation of symbols in "Type of license" column: B=Nonexclusive, irrevocable, royalty-free license for specific or general purposes. C=Sole license, with sole right to grant sublicenses, for specific nonatomic energy purposes or for purposes other than use in the production of special nuclear material or atomic energy]

Patent No.	Subject matter	Inventors	Contractor and address	Date of license	Type of license
2,804,573	Gas discharge devices	M. W. Arrol, S. Jefferson	U.K. Government	Dec. 14, 1956	B
2,806,255	Process of making an expanded cellular product	T. J. Dietz	Delaware Research & Development Corp., Wilmington, Del.	July 13, 1954	C
2,806,596	Metal extrusion process	H. W. Dodds, C. B. Sawyer	Brush Beryllium, Cleveland, Ohio	Apr. 20, 1953	C
2,806,764	Uranium recovery and purification process and production of high purity uranium tetrafluoride.	R. H. Bailes, R. S. Long, R. R. Grinstead.	Dow Chemical, Midland, Mich	Nov. 20, 1953	B
2,806,960	Quartz fiber electroscopes	R. P. Henderson	U.K. Government	Oct. 3, 1957	B
2,807,006	Magnetic amplifier circuits	H. W. Collins, R. W. Roberts, W. J. Dunnet.	Westinghouse, Pittsburgh, Pa	Nov. 11, 1955	C
2,807,082	Welding process	J. Zambrow, H. Hausner	Sylvania Electric, New York, N.Y	Oct. 15, 1952	B
2,807,518	Process for recovery of uranium and vanadium from carbonate solutions by reduction-precipitation.	D. A. Ellis, R. O. Lindblom	Dow Chemical, Midland, Mich	Nov. 20, 1954	B
2,807,580	Thermal nuclear reactor	F. W. Fenning, R. F. Jackson	U.K. Government	Apr. 1, 1957	B
2,807,722	Pulse generator	C. W. Roeschke	Western Electric, New York, N.Y	Feb. 3, 1955	B
2,807,785	Line-above-ground attenuator	R. B. Wilds, J. R. Ames	do	Jan. 10, 1955	B
2,807,857	Production of thoria ware	P. Murray, I. E. Denton, D. Wilkinson.	U.K. Government	Mar. 25, 1958	B
2,808,312	Process for treating volatile metal fluorides	A. J. Rudge, A. J. Lowe	do	Dec. 31, 1957	B
2,809,887	Method of alloying reactive metals with aluminum or beryllium.	O. J. C. Runnalls	Government of Canada	Apr. 17, 1957	B
2,810,828	Pulse amplitude analyzer	G. W. Gray, A. S. Jensen	Radio Corp. of America, Princeton, N.J	May 7, 1957	B
2,812,232	Prevention of scale formation in uranium solvent extraction.	J. W. Delaplaine	Catalytic Construction Co., Philadelphia, Pa	Oct. 29, 1953	B
2,813,003	Alkaline carbonate leaching process for uranium extraction.	A. Thunaes, E. A. Brown, A. T. Rabbitts.	Government of Canada	July 30, 1957	B
2,813,978	Electron emission regulating means	I. R. Brenholdt	Kellex Corp., New York, N.Y	Dec. 19, 1947	B
2,814,477	Retort assembly	C. C. Loomis, W. J. Ash	Nelco Metals, Inc., Adams, Mass	Sept. 24, 1954	B
2,814,772	Electrical circuits using cold-cathode triode valves.	F. S. Goulding	U.K. Government	July 10, 1958	B
2,815,261	Uranium precipitation process	A. Thunaes, E. A. Brown, R. Simard & H. W. Smith.	Government of Canada	Feb. 19, 1957	B
2,817,019	Shock-excited oscillator	R. Creveling	Western Electric, New York, N.Y	Dec. 28, 1955	B
2,817,060	Nondestructive flaw detection apparatus	M. J. Stateman, H. R. Holloway	Sylvania Electric, New York, N.Y	June 28, 1954	B
2,817,605	Method for sealing the pores in a carbon body	M. C. Sanz, C. R. Malmstrom, J. M. Nuding, H. P. Yockey.	North American Aviation, Los Angeles, Calif	Feb. 11, 1949	B
2,818,324	Liquid- liquid extraction columns	J. D. Thornton	U.K. Government	Mar. 15, 1957	B
2,818,339	Method for producing malleable and ductile beryllium bodies.	H. W. Dodds	Brush Beryllium, Cleveland, Ohio	Apr. 19, 1955	C

2,818,726	Automatic calibrating system for pressure transducers.	E. L. Amonette, G. W. Rodgers	Western Electric, New York, N.Y.	Nov. 16, 1955	B.
2,819,053	Acceleration integrator	K. E. Pope	do	Apr. 16, 1957	B.
2,819,145	Metal value recovery from leached zone material.	R. F. McCullough, W. J. McGinnis	International Minerals & Chemical Corp., Skokie, Ill.	Apr. 11, 1953	C.
2,820,182	Photosensitive relay control circuit	C. F. Martin	Western Electric, New York, N.Y.	Nov. 4, 1955	B.
2,821,636	Go-devils	S. Jefferson	U.K. Government	Mar. 11, 1957	B.
2,823,116	Method of preparing sintered zirconium metal from its hydrides.	R. P. Angier	Sylvania Electric, New York, N.Y.	Sept. 10, 1951	B.
2,823,350	Methods of locating grounds	K. Macleish	Tennessee Eastman Corp., Oak Ridge, Tenn.	Jun 22, 1948	B.
2,824,971	Neutron detector	I. F. Weeks	North American Aviation, Los Angeles, Calif.	Oct. 15, 1957	C.
2,825,599	Grab mechanisms	K. H. Dent	U.K. Government	Apr. 1, 1957	B.
2,826,076	Automatic sampling device	J. E. Boretz, J. A. Bolton, J. B. Williams.	American Machine & Foundry, New York, N.Y.	Oct. 5, 1954	C.
2,827,569	Stabilized oscillator	P. L. Jessen, H. L. Price	Western Electric, New York, N.Y.	Mar. 8, 1956	B.
2,828,425	Pulse amplitude analyzer	M. H. Greenblatt	Radio Corp. of America, Princeton, N.J.	Nov. 8, 1957	B
2,828,875	Remote handling arrangements	D. W. Ginns	United Kingdom Government	Sept. 6, 1957	B
2,828,981	Joint between carbonaceous members using molybdenum disilicide bond.	E. L. Reed	North American Aviation, Los Angeles, Calif.	Dec. 15, 1953	C
2,829,031	Method of producing phosphorus oxychloride	D. H. Reeve	International Minerals & Chemical Corp., Skokie, Ill.	Mar. 5, 1956	C
2,829,293	Lead severing contrivance	W. Widmaier	Radio Corp. of America, Princeton, N.J.	Nov. 1, 1957	B
2,830,072	Recovery of uranium values from phosphate rock.	R. F. McCullough	International Minerals & Chemical Corp., Skokie, Ill.	Apr. 11, 1953	C
2,830,874	Ion exchange process for the recovery and purification of materials.	R. S. Long, R. H. Bailes	Dow Chemical Co., Midland, Mich.	July 12, 1950	B
2,831,162	Time interval measuring device	J. E. Gross	Western Electric, New York, N.Y.	June 2, 1955	B
2,832,727	Electrolytic precipitation of uranium from the ion exchange eluates.	R. Kunin	Rohm & Haas, Philadelphia, Pa.	April 21, 1954	C
2,832,728	Electrolytic precipitation of uranium values from carbonate leach liquors.	do	do	do	C
2,833,621	Method of preparing metallurgical grade alumina.	D. H. Reeve	International Minerals & Chemical Corp.	Mar. 5, 1956	C
2,835,552	Solvent extraction process for the recovery of uranium values from aqueous solutions.	W. J. McGinnis	do	Apr. 11, 1953	C
2,835,555	Reduction of acidity of nitric acid solutions by use of formaldehyde.	T. V. Healy	Sylvania-Corning Nuclear, New York, N.Y.	May 22, 1957	B
2,835,630	Treatment of metals prior to electroplating	R. A. U. Huddle, O. Flint	United Kingdom Government	Sept. 12, 1957	B
2,835,890	Directional antenna	B. J. Bittner	Western Electric, New York, N.Y.	May 12, 1953	B
2,836,865	Crucible pour mechanism	R. F. Bravard, J. W. Mahaffey, McD. S. Nelson.	National Lead, New York, N.Y.	Mar. 9, 1956	C
2,837,412	Preparation of impervious graphite by liquid phase impregnation.	G. A. Bennett	North American Aviation, Los Angeles, Calif.	Oct. 16, 1957	C
2,837,639	Pulse amplitude analyzers	G. W. Gray, A. S. Jensen	Radio Corp. of America, Princeton, N.J.	Nov. 23, 1954	B
2,837,818	Method of solid state welding	S. Storchheim	Sylvania Electric, New York, N.Y.	June 28, 1954	B
2,838,368	Treatment of ammonium nitrate solutions	T. W. Boyer, J. G. MacHutchin, L. Yaffe.	Government of Canada	Sept. 10, 1957	B
2,838,451	Gas cooled nuclear reactors	E. Long, W. Rodwell	United Kingdom Government	Mar. 15, 1957	B
2,839,005	Turbine driven pump	H. E. Means	United Aircraft, Hartford, Conn.	Nov. 19, 1953	C
2,840,788	Loaded waveguides	L. B. Mullett, B. G. Loach, G. L. Adams.	United Kingdom Government	Sept. 30, 1957	B

SCHEDULE B—Continued

[Explanation of symbols in "Type of license" column: B=Nonexclusive, irrevocable, royalty-free license for specific or general purposes. C=Sole license, with sole right to grant sublicenses, for specific nonatomic energy purposes or for purposes other than use in the production of special nuclear material or atomic energy]

Patent No.	Subject matter	Inventors	Contractor and address	Date of license	Type of license
2,840,026	Nut screw mechanisms	J. A. F. Glass	United Kingdom Government	Mar. 15, 1957	B
2,841,467	Method for recovery of minerals values from leached zone material.	R. F. McCullough	International Minerals & Chemical Corp	Mar. 5, 1956	C
2,841,727	Quantizing tube	A. S. Jensen, G. W. Gray	Radio Corp. of America, Princeton, N.J	Mar. 19, 1958	B
2,842,224	Deentrainment column	A. J. Mooradian	Government of Canada	Feb. 4, 1957	B
2,843,450	Method of recovering uranium mineral values	H. W. Long, Jr	International Minerals & Chemical Corp., Skokie, Ill.	Mar. 5, 1956	C
2,845,596	Peak reading voltmeter	A. L. Dyer	Western Electric, New York, N.Y	Nov. 18, 1953	B
2,845,716	Alining jig	J. S. Culver, W. C. Tunnell	Tennessee Eastman Corp., Oak Ridge, Tenn	Feb. 5, 1945	B
2,847,276	Solvent extraction of neptunium	J. P. Butler	Government of Canada	Apr. 18, 1957	B
2,847,331	Hydrogen isotope targets	R. W. Ashley	do	Apr. 17, 1957	B
2,847,635	Electrical regulation apparatus including an ionic current regulator.	H. W. Brackney	Tennessee Eastman Corp., Oak Ridge, Tenn	July 24, 1946	B
2,848,505	Process for zinc chloride activating a dehalogenation reaction.	W. T. Miller	M. W. Kellogg Co., New York, N.Y	Oct. 24, 1956	C
2,848,881	Thermally shielded moisture removal device	O. E. Miller	Tennessee Eastman Corp., Oak Ridge, Tenn	July 18, 1946	B
2,849,278	Metal value recovery from phosphate rock	C. A. Feldt	International Minerals & Chemical Corp	Apr. 11, 1953	C
2,849,279	Catalytic promotion of the adsorption of vanadium on an anionic exchange resin.	D. A. Ellis, R. H. Bailes	Dow Chemical Co., Midland, Mich	Jan. 22, 1953	B
2,849,280	Nitric acid treatment of leached zone material	I. M. LeBaron, R. F. McCullough	International Minerals & Chemical Corp., Skokie, Ill.	Apr. 26, 1956	C
2,849,281	Organic extractant and method of solvent extractant mineral values.	R. F. McCullough	do	Feb. 3, 1953	C
2,849,313	Preparation of metal powder compacts prior to pressing.	H. Mansfield	Sylvania Electric, New York, N.Y	do	B
2,849,616	Isotope separators	C. G. Bacon	Tennessee Eastman Corp., Oak Ridge, Tenn	Jan. 11, 1945	B
2,850,358	Recovery of iron, aluminum, and phosphate values from leach zone material.	D. H. Reeve	International Minerals & Chemical Corp., Skokie, Ill.	Mar. 5, 1956	B
2,850,634	Calutron structure	D. Price	Tennessee Eastman Corp., Oak Ridge, Tenn	July 2, 1945	B
2,850,637	Calutrons	J. Thornton	Stone & Webster, Engineering Corp., Boston, Mass.	Apr. 8, 1945	C
2,850,798	Method of bonding zirconium	F. E. Bowman, E. L. Reed	North American Aviation, Los Angeles, Calif	Aug. 30, 1954	C
2,852,319	Thrust bearing	P. R. Heller	Westinghouse, Pittsburgh, Pa	Oct. 9, 1944	B
2,852,338	Separation of plutonium from elements having an atomic number not less than 92.	F. T. Fitch, D. S. Russell	Government of Canada	Sept. 10, 1957	B
2,852,457	Nuclear reactor	E. Long, J. W. Ashley	United Kingdom Government	Mar. 15, 1957	B
2,852,460	Fuel-breeder fuel element for nuclear reactor	R. Balent, W. E. Abbott	North American Aviation, Los Angeles, Calif	June 18, 1957	B
2,852,687	Isotope separating apparatus	M. K. Kudravetz	Tennessee Eastman Corp., Oak Ridge, Tenn	Aug. 23, 1945	B
2,852,746	Voltage-controlled transistor oscillator	P. F. Scheele	Western Electric, New York, N.Y	Mar. 16, 1956	B
2,853,441	Surface treatment of uranium	O. Flint	U.K. Government	Sept. 6, 1957	B
2,853,446	Fuel-breeder element for a nuclear reactor	R. Balent, W. E. Abbott	North American Aviation, Los Angeles, Calif	June 18, 1957	B

			M. W. Kellogg Co., New York, N.Y	May 9, 1945	B

2,853,859	Cold traps	W. E. Thompson	M. W. Kellogg Co., New York, N.Y	May 9, 1945	B
2,855,281	Apparatus for condensation and sublimation	R. J. Schmidt, F. Fuis	Tennessee Eastman Corp., Oak Ridge, Tenn	Oct. 5, 1945	B
2,857,745	Separation of fluid mixtures	R. Lipscomb, J. F. Dunn, A. Craig & S. Labrow.	U.K. Government	Dec. 31, 1957	B
2,858,146	Coupling means for liquefied-gas conduits	G. A. Bleyle, Jr	Arthur D. Little, Cambridge, Mass	Jan. 24, 1956	C
2,858,187	Uranium recovery	F. T. Fitch, A. J. Cruikshank	Government of Canada	Sept. 10, 1957	B
2,858,196	Extraction apparatus	A. E. Ballard, R. Brigham	Tennessee Eastman Corp., Oak Ridge, Tenn	Aug. 14, 1945	B
2,859,092	Solvent extraction process for the recovery of metals from phosphoric acid.	R. S. Long, R. H. Balles	Dow Chemical, Midland, Mich	Jan. 13, 1954	B
2,859,353	Circuits for current measurements	R. J. Cox	U.K. Government	Jan. 7, 1958	B
2,860,031	Process for utilizing organic orthophosphate extractants.	R. R. Grinstead	Dow Chemical, Midland, Mich	June 21, 1956	B
2,860,269	Gas discharge devices	S. Jefferson	U.K. Government	Mar. 15, 1957	B
2,860,279	High current linear ion accelerator	R. E. Hester, D. O. Kippenhan, W. A. S. Lamb.	California Research & Development, San Francisco, Calif.	Apr. 1, 1955	C
2,860,956	Production of metals and their compounds	T. V. Arden, F. H. Burstall, G. R. Davies, R. P. Linstead & R. A. Wells.	U.K. Government	Oct. 4, 1958	B
2,861,201	Electronic pulse scaling circuits	E. H. Cooke-Yarborough	do	Feb. 27, 1957	B

Question 3. List of Commission patents on various reactor types including: A. Pressurized water; B. Boiling water; C. Organic moderated; D. Sodium-cooled; E. Homogeneous; F. Fast breeder; G. Gas-cooled; H. Other.

Answer 3. There is set forth in schedules noted below the Commission-owned patents on various reactor types and instrumentation associated therewith as follows:

Schedule A: Pressurized water.
Schedule B: Boiling water.
Schedule C: Organic moderated.
Schedule D: Sodium-cooled.
Schedule E: Homogeneous.
Schedule F: Fast breeder.
Schedule G: Gas-cooled.
Schedule H: Other.

In addition to the foregoing there is also set forth the following information in:

Schedule I: Nuclear reactor—Reactor Components—General.
Schedule J: Nuclear reactor—Auxiliary equipment—General.
Schedule K: Nuclear reactor instrumentation—Useful in connection with nuclear reactors, nuclear investigation, radiation measurement, and the like.

COMMISSION-OWNED PATENTS

Nuclear reactors

SCHEDULE A—PRESSURIZED WATER REACTORS

Patent No.	Issued	Serial No.	Filed	Inventor	Title
2,810,689	Oct. 22, 1957	627,070	Nov. 6, 1945	E. P. Wigner, L. A. Ohlinger, G. J. Young & A. M. Weinberg	Fluid moderated reactor.

SCHEDULE B—BOILING WATER REACTOR

2,809,157	Oct. 8, 1957	634,317	Dec. 11, 1945	H. E. Metcalf	Neutronic reactor.
2,825,688	Mar. 4, 1958	628,320	Nov. 13, 1945	H. C. Vernon	Power generating neutronic reactor system.
2,861,033	Nov. 18, 1958	580,965	Apr. 26, 1956	M. Treshow	Horizontal boiling reactor system.

SCHEDULE C—ORGANIC MODERATED

No patents issued to date.

SCHEDULE D—SODIUM COOLED AND COMPONENTS

Patent No.	Issued	Serial No.	Filed	Inventor	Title
2,798,848	July 9, 1957	236,646	July 13, 1951	K. H. Kingdom	Neutronic reactor fuel element.
2,799,642	July 16, 1957	236,644	do	H. Hurwitz, C. Mannal, H. Brooks, J. H. Payne & E. A. Luebke.	Do.
2,841,545	July 1, 1958	437,017	June 15, 1954	W. H. Zinn	Power reactor.
2,852,456	Sept. 16, 1958	392,783	Nov. 17, 1953	E. J. Wade	Neutronic reactor (reflector control for heterogeneous, solid moderator, sodium-cooled reactor).
2,852,460	do	602,401	Aug. 6, 1956	W. E. Abbott & R. Balent	Fuel-breeder fuel element for nuclear reactor.
2,853,446	Sept. 23, 1958	602,402	do	do	Fuel-breeder element for a nuclear reactor.

SCHEDULE E—HOMOGENEOUS

2,743,225	Apr. 24, 1956	693,330	Aug. 27, 1946	L. A. Ohlinger, E. P. Wigner, G. J. Young & A. M. Weinberg	Reactor, slurry.
2,744,064	May 1, 1956	676,648	June 14, 1946	T. V. Moore	Reentrant cooling reactor.
2,811,487	Oct. 29, 1957	713,653	Dec. 3, 1946	H. E. Stanton	Neutron reactor having an Xe^{135}.
2,815,321	Dec. 3, 1957	628,322	Nov. 13, 1945	E. P. Wigner, L. A. Ohlinger, & G. J. Young	Isotope conversion device.
2,820,753	Jan. 21, 1958	100,876	June 23, 1949	H. S. Miller & R. C. Smith	Nuclear reactor.
2,837,476	June 3, 1958	561,961	Jan. 27, 1956	H. M. Busey	Steam stirred homogeneous nuclear reactor.

COMMISSION-OWNED PATENTS—Continued

Nuclear reactors—Continued

SCHEDULE E—HOMOGENEOUS—Continued

Patent No.	Issued	Serial No.	Filed	Inventor	Title
2,840,522	June 24, 1958	617,122	Sept. 18, 1945	G. J. Young & L. A. Ohlinger	Reactor and novel method.
2,843,543	July 15, 1958	623,363	Oct. 19, 1945	R. F. Christy	Neutronic reactor.
2,865,827	Dec. 23, 1958	511,805	May 27, 1955	O. E. Dwyer	Power generation from liquid metal nuclear fuel (reactor using fissionable material suspended in bismuth as fuel).

SCHEDULE F—FAST BREEDER

2,815,319	Dec. 3, 1957	621,843	Oct. 11, 1945	A. H. Snell	Fast neutronic reactor.

SCHEDULE G—GAS COOLED

2,708,656	May 17, 1955	568,904	Dec. 19, 1944	E. Fermi & L. Szilard	Neutronic reactor.
2,774,730	Dec. 18, 1956	552,730	Sept. 5, 1944	G. J. Young	Neutronic reactor having a flattened activity curve.
2,780,596	Feb. 5, 1957	194,331	Jan. 6, 1950	G. A. Anderson	Neutronic reactor.
2,782,158	Feb. 19, 1957	626,376	Nov. 2, 1945	J. A. Wheeler	Do.
2,790,760	Apr. 30, 1957	449,031	Aug. 10, 1954	R. W. Powell	Do.
2,798,847	July 9, 1957	323,452	Dec. 1, 1952	E. Fermi & L. Szilard	Method of operating a neutronic reactor.
2,807,580	Sept. 24, 1957	276,604	Mar. 14, 1952	F. W. Fenning & E. F. Jackson	Thermal nuclear reactor.
2,809,931	Oct. 15, 1957	621,845	Oct. 11, 1945	F. Daniels	Neutronic reactor system.
2,813,070	Nov. 12, 1957	631,406	Nov. 28, 1945	E. Fermi & M. C. Leverett	Method of sustaining a neutronic chain reacting system.
2,827,429	Mar. 18, 1958	296,332	June 30, 1952	C. R. Binner & C. B. Wilkie	Cooled neutronic reactor.
2,831,807	Apr. 22, 1958	387,553	July 22, 1953	R. J. McGarry	Neutronic reactor.
2,836,554	May 27, 1958	596,465	May 29, 1945	E. Fermi & L. Szilard	Air-cooled neutronic reactor.
2,837,475	June 3, 1958	305,597	Aug. 21, 1952	H. W. Newson	Neutronic reactor having localized areas of high thermal neutron densities.
2,837,477	do	578,278	Feb. 16, 1945	E. Fermi & M. C. Leverett	Chain reacting system.
2,863,815	Dec. 9, 1958	444,964	July 22, 1954	R. V. Moore, K. H. Dent, & J. H. Bowen	Nuclear reactor (heterogenous, graphite moderator).

SCHEDULE H—MISCELLANEOUS

2,206,634	July 2, 1948	43,462	Oct. 3, 1935	E. Fermi, E. Amaldi, B. Pontecoroo, F. Rasetti, & E. Segre	Process for the production of radioactive substances.
2,714,577	Aug. 2, 1955	626,383	Nov. 2, 1945	E. Fermi & W. H. Zinn	Neutronic reactor.
2,736,696	Feb. 28, 1956	613,355	Sept. 29, 1945	E. P. Wigner, L. A. Ohlinger, G. J. Young, & A. M. Weinberg	Reactor (thermal, heavy water moderated).
2,741,593	Apr. 10, 1956	627,073	Nov. 6, 1945	H. E. Metcalf, H. W. Johnson, & R. S. Chisholm	Fluid cooled neutronic reactor.

2,741,593	Apr. 10, 1956	627,073	Nov. 6, 1945	H. E. Metcalf, H. W. Johnson, & R. S. Chisholm	Fluid cooled neutronic reactor.
2,743,224	Apr. 24, 1956	676,598	Nov. 14, 1946	L. A. Ohlinger	Submerged reactor.
2,770,591	Nov. 13, 1956	681,252	Aug. 3, 1946	E. P. Wigner, L. A. Ohlinger, G. J. Young, & A. M. Weinberg	Moderated neutronic reactor.
2,780,595	Feb. 5, 1957	534,129	May 4, 1944	E. Fermi	Test exponential pile.
2,796,396	June 18, 1957	662,512	Apr. 16, 1946	L. Szilard	Method of intermittently operating a neutronic reactor.
2,796,398	----do----	701,904	Oct. 8, 1946	E. C. Creutz, L. A. Ohlinger, E. P. Wigner, & G. J. Young	A nuclear fission chain reaction.
2,787,593	Apr. 2, 1957	649,408	Feb. 21, 1946	H. A. Metcalf	Method and means of producing steam in neutronic reactors.
2,806,819	Sept. 17, 1957	640,100	Jan. 9, 1946	R. F. Christy & A. M. Weinberg	Light water moderated neutronic reactor.
2,806,820	----do----	769,301	Aug. 18, 1947	E. P. Wigner	Neutronic reactor—superheated steam.
2,807,581	Sept. 24, 1957	621,838	Oct. 11, 1945	E. Fermi & L. Szilard	Neutronic reactor.
2,812,303	Nov. 5, 1957	621,844	----do----	F. Daniels	Atomic powerplant (boiling bismuth).
2,812,304	Nov. 5, 1957	640,101	Jan. 9, 1946	J. A. Wheeler	Means for cooling reactors.
2,825,689	Mar. 4, 1958	664,732	Apr. 25, 1946	L. Szilard & G. J. Young	Neutronic reactor and fuel element therefor.
2,830,944	Apr. 15, 1958	613,154	Aug. 28, 1945	E. P. Wigner & G. J. Young	Neutronic reactor.
2,831,806	Apr. 22, 1958	314,595	Oct. 14, 1952	E. P. Wigner	Do.
2,832,733	Apr. 29, 1958	664,145	Apr. 23, 1946	L. Szilard	Heavy water moderated neutronic reactor.
2,848,404	Aug. 19, 1958	601,845	Aug. 2, 1956	M. Treshov	Neutronic reactor (heterogeneous-heavy water moderator and coolant).
2,850,447	Sept. 2, 1958	626,377	Nov. 2, 1945	L. A. Ohlinger, E. P. Wigner, A. M. Weinberg & G. J. Young	Neutronic reactor (heterogeneous-graphite moderated liquid cooled—loading and unloading device).
2,851,409	Sept. 9, 1958	321,117	Nov. 18, 1952	W. T. Moore	Neutronic reactor fuel element and core system (heterogeneous-water moderated and cooled).
2,852,457	Sept. 16, 1958	519,056	June 30, 1955	E. Long & J. W. Ashley	Nuclear reactor (graphite moderator structure for heterogeneous reactor).
2,852,461	----do----	621,837	Oct. 11, 1955	E. Fermi, W. H. Zinn & H. L. Anderson	Neutronic reactor (heterogeneous-solid moderator).
2,856,337	Oct. 14, 1958	611,396	Sept. 21, 1956	S. Untermyer	Method of operating nuclear reactors (heterogeneous-heavy water moderated).
2,857,324	Oct. 21, 1958	586,629	May 22, 1956	D. R. deBoisblanc, M. E. Thomas, R. M. Jones, G. H. Hanson & U. W. Webster.	Engineering test reactor (heterogeneous water moderated and cooled).
2,861,034	Nov. 18, 1958	617,123	Sept. 18, 1945	E. P. Wigner & L. A. Ohlinger	Neutronic reactor shield and spacer construction (heterogeneous, graphite moderated, water cooled).
2,864,759	Dec. 16, 1958	519,055	June 30, 1955	E. Long & J. W. Ashley	Nuclear reactors (graphite moderator structure for heterogeneous gas-cooled reactor).
2,865,826	Dec. 23, 1958	366,621	July 7, 1953	H. B. Steward	Neutronic reactor (heterogeneous-graphite water and paraffin oil moderated—for irradiation of materials).

SCHEDULE I—REACTOR COMPONENTS—GENERAL

2,580,360	Dec. 25, 1951	575,569	Jan. 31, 1945	P. Morrison	X-ray shield.
2,716,705	Aug. 30, 1955	585,158	Mar. 27, 1945	W. H. Zinn	Radiation shield.
2,726,339	Dec. 6, 1955	79,552	Mar. 3, 1949	L. B. Borst	Concrete radiation shielding means.
2,727,996	Dec. 20, 1955	303,704	Aug. 11, 1952	T. Rockwell & V. L. McKinney	Thermal neutron shield and method for making same.
2,728,128	Dec. 27, 1955	256,781	Nov. 29, 1951	C. Sheer & J. Tittman	Method of producing boron carbide articles and product thereof.
2,735,811	Feb. 21, 1956	634,858	Dec. 13, 1945	A. M. Weinberg, G. J. Young, P. Morrison & L. A. Ohlinger	Reactor control.
2,743,174	Apr. 24, 1956	644,965	Apr. 25, 1946	J. R. Keeler & H. A. Saller	Uranium-titanium alloys.
2,781,308	Feb. 12, 1957	588,061	Apr. 12, 1945	E. C. Creutz & W. N. Zinn	Neutronic reactor control.
2,790,761	Apr. 30, 1957	288,202	May 16, 1952	L. A. Ohlinger	Neutonic reactor (control).

COMMISSION-OWNED PATENTS—Continued

Nuclear reactors—Continued

SCHEDULE I—REACTOR COMPONENTS—GENERAL—Continued

Patent No.	Issued	Serial No.	Filed	Inventor	Title
2,796,411	June 18, 1957	725,144	Jan. 29, 1947	R. E. Zirkle & H. J. Curtis	Radiation shield.
2,796,529	do	45,681	Aug. 23, 1948	P. Morrison	Do.
2,805,473	Sept. 10, 1957	608,414	Sept. 6, 1956	J. H. Handwerk, R. A. Noland & D. E. Walker	Uranium-oxide-containing fuel element composition and method of making same.
2,807,082	Feb. 24, 1957	306,338	Aug. 26, 1952	J. Zambrow & H. H. Hausner	Welding process.
2,807,727	Sept. 24, 1957	641,625	Jan. 16, 1946	E. Fermi & W. H. Zinn	Neutronic reactor shield.
2,813,073	Nov. 12, 1957	265,018	Jan. 4, 1952	H. A. Saller, J. R. Keeler, & E. R. Szumachowski	Neutro reactor fuel element utilizing zirconium-base alloys.
2,814,857	Dec. 3, 1957	362,128	June 16, 1953	W. H. Duckworth	Ceramic fuel element material for a neutronic reactor and method of fabricating same.
2,816,068	Dec. 10, 1957	631,405	Nov. 28, 1945	W J. Ruano	Reactor control.
2,816,860	Dec. 17, 1957	588,302	Apr. 14, 1945	V. C. Wilson, W. P. Overbeck, L. Slatin & D. K Froman	Means for controlling a nuclear reactor.
2,817,605	Dec. 24, 1957	736,630	Mar. 24, 1947	M. C. Sanz, C R. Malmstrom, J. M. Nuding & H. P. Yockey	Method for sealing the pores in a carbon body.
2,818,605	Jan. 7, 1958	100,963	June 23, 1949	H. I. Miller	Method of making a refractory material.
2,820,751	Jan. 21, 1958	323,348	Dec. 1, 1952	H. A Saller	Process for producing jacketed bodies
2,826,945	Mar. 11, 1958	684,117	July 17, 1946	F. H. Spedding & H A. Wilhelm	Alloy for use in nuclear fission.
2,830,896	Apr. 15, 1958	31,599	June 7, 1948	A. U. Seybolt	Uranium alloys.
2,832,732	Apr. 29, 1958	360,190	June 8, 1953	E. P. Wigner	Fuel assembly for a neutronic reactor.
2,835,608	May 20, 1958	169,790	June 22, 1950	M. A. Kanter	Process of preparing uranium-impregnated graphite body.
2,838,451	June 10, 1958	546,363	Nov. 14, 1955	E Long & W. Rodwell	Gas cooled nuclear reactors (gas seal).
2,848,325	Aug. 19, 1958	634,593	Jan. 16, 1957	W. E. Roake	Fuel elements for nuclear reactors and process of making
2,848,352	do	627,085	Dec. 7, 1956	R. A. Noland	Fuel elements and method of making.
2,848,797	Aug. 26, 1958	588,708	Apr. 16, 1945	L. D. Eubank	Metal coated article and method of making (fuel elements).
2,848,800	do	596,215	May 28, 1945	J. O. Maloney, E. B. Haines, & J. B. Tepe	Method of jacketing uranium bodies (fuel elements).
2,849,387	do	591,302	May 1, 1945	E. W. Brugmann	Corrosion resistant jacketed metal body (fuel elements).
2,849,388	do	595,185	May 22, 1945	do	Do.
2,849,389	do	600,400	June 19, 1945	do	Do.
2,849,390	do	621,839	Oct. 11, 1945	D. H. Gurinsky	Welded jacketed uranium body (fuel elements).
2,852,458	Sept. 16, 1958	554,594	Dec. 21, 1955	J. R. Dietrich & J. M. Harrer	Apparatus for controlling neutronic reactors.
2,853,624	Sept. 23, 1958	595,184	May 22, 1945	E. P. Wigner & G. J. Young	Radiation shielding device.
2,854,737	Oct. 7, 1958	571,673	Jan. 6, 1945	A. G. Gray	Copper coated uranium article.
2,854,738	do	572,093	Jan. 9, 1945	do	Nickel coated uranium article.
2,855,354	do	589,226	Apr. 19, 1945	H. L. Anderson	Neutronic reactors (control road).
2,855,355	do	631,412	Nov. 28, 1945	L. A. Ohlinger & C. M. Cooper	Jacketed uranium slug.
2,856,336	Oct. 14, 1958	597,474	June 4, 1945	H. E. Metcalf	Neutronic reactor control.
2,856,339	do	596,219	May 28, 1945	E. P. Wigner & G. J. Young	Neutronic reactor (fuel loading device).
2,856,340	do	599,538	June 15, 1945	E. P. Wigner, R. R. Williamson, and G. J. Young	Shaped fissionable metal bodies (fuel elements).
2,856,341	do	610,604	Aug. 13, 1945	W. R. Kanne	Nuclear reactor slug provided with thermocouple.

2,858,262	Oct. 28, 1958	510,560	Nov. 16, 1943	R. F. Plott	Protectively covered article and method of manufacture (fuel elements).
2,859,138	Nov. 4, 1958	383,421	Sept. 30, 1953	M. K. Blanchard	Composition and method for coating a ceramic body (carbide-carbon moderator).
2,861,035	Nov. 18, 1958	635,566	Jan. 18, 1957	W. H. Zinn	Control rod.
2,863,814	Dec. 9, 1958	311,574	Sept. 26, 1952	K. A. Kesselring and A. U. Seybolt	Neutronic reactor fuel element.
2,863,816	do	542,119	Oct. 21, 1955	J. T. Stacy	Do.
2,864,758	Dec. 16, 1958	416,969	Mar. 17, 1954	M. H. Shackelford	Do.
2,866,741	Dec. 30, 1958	324,835	Dec. 8, 1952	H. H. Hausner	Control rod for a nuclear reactor and method of preparation.

SCHEDULE J—AUXILIARY EQUIPMENT—GENERAL

2,476,249	July 12, 1949	61,837	Nov. 24, 1948	J. H. Payne, Jr	Remote control handling equipment.
2,509,669	May 30, 1950	583,498	Mar. 19, 1945	L. B. Borst	Mechanical coupling.
2,514,909	July 11, 1950	70,963	Jan. 14, 1949	G. Strickland	Carrier for radioactive slugs.
2,558,698	June 26, 1951	151,731	Mar. 24, 1950	E. J. Wade	Electromagnetic pump.
2,587,919	Mar. 4, 1952	129,719	Nov. 28, 1949	H. A. Straus, P. R. Bell & F. H. Murray	Electric apparatus for simulating the time dependent response characteristic of neutronic reactors.
2,594,970	Apr. 29, 1952	719,551	Dec. 31, 1946	G. S. Monk	Viewing device for radioactive materials.
2,595,134	do	203,962	Jan. 2, 1951	C. M. Gordon	Universal manipulator.
2,632,574	Mar. 24, 1953	133,440	Dec. 16, 1949	R. C. Goertz	Remote control manipulator.
2,652,778	Sept. 22, 1953	114,211	Sept. 6, 1949	F. E. Crever	Electromagnetic centrifugal pump.
2,655,107	Oct. 13, 1953	182,833	Sept. 1, 1950	N. H. Godbold	Electromagnetic fluid pump.
2,658,452	Nov. 10, 1953	30,860	June 3, 1948	K. O. Donelian	Electromagnetic pump.
2,664,998	Jan. 5, 1954	136,778	Jan. 4, 1950	J. F. Gifford & N. B. Garden	Container for neutron irradiated material.
2,669,183	Feb. 16, 1954	212,961	Feb. 27, 1951	N. H. Godbold	Electromagnetic fluid pump.
2,669,931	Feb. 23, 1954	182,121	Aug. 29, 1950	do	Do.
2,679,940	June 15, 1954	234,128	June 28, 1951	R. C. Goertz & D. F. Uecker	Electrical manipulator.
2,682,785	July 6, 1954	238,479	July 25, 1951	B. C. Cerutti & H. V. Lichtenberger	Control rod drive mechanism.
2,686,474	Aug. 17, 1954	239,459	July 31, 1951	O. O. Pulley	Electromagnetic pump.
2,689,318	Sept. 14, 1954	237,394	July 18, 1951	R. C. Goertz & F. Bevilacqua	A positioning device.
2,689,629	Sept. 21, 1954	38,434	July 13, 1948	J. W. Kendall & I. H. Morrison	Reduction of the momentum of falling bodies.
2,695,715	Nov. 30, 1954	335,454	Feb. 6, 1953	R. C. Goertz & R. A. Schmitt	Remote control manipulator.
2,716,943	Sept. 6, 1955	331,653	Jan. 6, 1953	L. V. Vandenberg	Liquid metal high pressure pump.
2,725,993	Dec. 6, 1955	243,965	Aug. 28, 1951	P. P. Smith	Positioning device (reactor fuel charging).
2,730,951	Jan. 17, 1956	139,604	Jan. 20, 1950	K. O. Donelian & J. R. Menke	Electromagnetic centrifugal pump.
2,732,807	Jan. 31, 1956	236,162	July 11, 1951	V. L. Parsegian	Diaphragm pump.
2,745,552	May 15, 1956	378,184	Sept. 2, 1953	W. H. Bruggeman & B. L. Voorhees	Filter with fractional crystallization means.
2,746,473	May 22, 1956	721,063	Jan. 9, 1947	L. A. Ohlinger	Valve means for charging containers with fluid.
2,748,710	June 5, 1956	504,125	Apr. 26, 1955	L. B. Vandenberg	Heat exchanger pump.
2,752,309	June 26, 1956	285,108	Apr. 30, 1952	A. H. Emmons & R. A. Lauderdale	Process for water decontamination.
2,756,857	July 31, 1956	226,616	May 16, 1951	W. H. McCorkle	P siti ming device.
2,756,858	do	151,470	Mar. 23, 1950	K. Kasschau	Fuel charging machine.
2,758,023	Aug. 7, 1956	350,910	Apr. 24, 1953	D. W. Bareis	Method of purifying fuels of nuclear reactor.
2,764,301	Sept. 25, 1956	501,008	Apr. 12, 1955	R. C. Goertz, R. G. Schmitt, Jr. & R. A. Olsen	Remote control manipulator.
2,768,134	Oct. 23, 1956	613,156	Aug. 28, 1945	E. Fermi & H. L. Anderson	Testing material in a neutronic reactor.
2,770,196	Nov. 13, 1956	384,090	Oct. 5, 1953	D. A. Watt	Electromagnetic interaction pump.
2,770,590	do	162,553	May 17, 1950	J. T. Serduke	Reactor circulating system.
2,771,199	Nov. 20, 1956	501,006	Apr. 12, 1955	D. G. Jelatis	Remote control manipulator.

COMMISSION-OWNED PATENTS—Continued

Nuclear reactors—Continued

SCHEDULE J—AUXILIARY EQUIPMENT—GENERAL—Continued

Patent No.	Issued	Serial No.	Filed	Inventor	Title
2,773,823	Dec. 11, 1956	595,189	May 22, 1945	J. J. Goett	Safety device for a neutronic reactor.
2,774,488	Dec. 18, 1956	516,340	June 17, 1955	R. C. Goertz, R. G. Schmitt, Jr., R. A. Olsen & R. B. Wehrle	Remote control manipulator.
2,777,812	Jan. 15, 1957	276,172	Mar. 12, 1952	R. W. Powell & P. H. Lee	Leak detection system.
2,778,792	Jan. 22, 1957	663,452	Apr. 19, 1946	L. Szilard	Method for unloading reactors.
2,779,728	Jan. 29, 1957	713,646	Dec. 3, 1946	W. H. Zinn & T. Brill	Control device for a neutronic reactor.
2,782,941	Feb 26, 1957	415,984	Mar. 12, 1954	H. V. Lichtenberger & L. J. Koch	Followup mechanism.
2,794,562	June 4, 1957	206,592	Jan. 18, 1951	G. A. Anderson	Fuel element loading apparatus for neutronic reactors.
2,803,601	Aug. 20, 1957	622,633	Oct. 16, 1945	C. M. Cooper	Reactor unloading means.
2,803,761	——do——	609,047	Sept. 10, 1956	J. N. Young	Electromagnetic apparatus for moving a rod.
2,811,923	Nov. 5, 1957	364,114	June 25, 1953	A. H. Barnes	Direct current electromagnetic pump.
2,815,277	Dec. 3, 1957	556,375	Dec. 29, 1955	W. H. Bruggeman & B. G. Voorhees	Method of removing sodium oxide from liquid sodium.
2,824,056	Feb. 18, 1958	621,687	Oct. 11, 1945	M. C. Leverett	Reactor unloading.
2,828,875	Apr. 1, 1958	549,204	Nov. 25, 1955	D. W. Ginns	Remote handling arrangements.
2,831,990	Apr. 22, 1958	548,555	Nov. 22, 1955	J. N. Young	Electromagnetic apparatus for moving a rod.
2,841,018	July 1, 1958	501,007	Apr. 12, 1955	J. J. Dickson	Quick release drive.
2,841,026	——do——	507,525	May 11, 1955	J. A. F. Glass	Nut screw mechanism.
2,846,084	Aug. 5, 1958	517,105	June 21, 1955	R. C. Goertz, W. N. Thompson & R. A. Olsen	Electronic master slave manipulator.
2,848,266	Aug. 19, 1958	559,083	Jan. 13, 1956	L. W. Fromm	Remote retrieving tool.
2,849,246	Aug. 26, 1958	597,475	June 4, 1945	S. N. Limzell & D. J. Dorcy	Closure device (for reactor process tube).
2,851,410	Sept. 9, 1958	596,220	May 28, 1945	H. C. Vernon & J. J. Goett	Neutronic reactor construction (fuel tube cap).
2,853,625	Sept. 23, 1958	610,648	Aug. 13, 1945	L. A. Ohlinger	Discharge device for radioactive material.
2,855,114	Oct. 7, 1958	585,762	Mar. 30, 1945	——do——	Loading device.
2,855,899	Oct. 14, 1958	582,305	May 2, 1956	B. J. Beaty	Device for controlling insertion of rod.
2,863,817	Dec. 9, 1958	622,719	Nov. 1, 1956	W. J. Morris	Reactor coolant tube seal (for heterogeneous-liquid-cooled reactor).
2,865,291	Dec. 23, 1958	289,684	May 23, 1952	D. A. Watt	Pumps for liquid current conducting material.
2,865,829	——do——	588,057	Apr. 12, 1945	H. W. Bellas & R. N. Lyon	Slug ejector.

SCHEDULE K—INSTRUMENTATION[1]

2,436,084	Feb. 17, 1948	512,070	Nov. 27, 1943	B. L. Weller	Ionization chamber.
2,437,458	Mar. 9, 1948	617,132	Sept. 18, 1945	G. S. Crampton	Inspection periscope.
2,437,476	——do——	544,109	July 8, 1944	H. M. Parker	Differential twin chamber neutron meter.
2,440,167	Apr. 20, 1948	518,972	Jan. 20, 1944	J. W. Broxan & W. P. Jesse	Differential ion chamber.
2,440,999	May 4, 1948	493,126	July 1, 1943	H. L. Anderson	Compressed neutron source.
2,442,314	May 25, 1948	605,543	July 17, 1945	A. F. Reid	Geiger counter improvement.
2,458,632	Jan. 11, 1949	634,315	Dec. 11, 1945	J. H. Parsons	Ionization chamber.
2,465,886	Mar. 29, 1929	704,782	Oct. 21, 1946	O. G. Landsverk & E. O. Wollan	Electrical measuring apparatus.

2,465,938	do	711,432	Nov. 21, 1946	F. R. Shonka	Radiation measuring device.
2,472,365	June 7, 1949	649,405	Feb. 21, 1946	C. J. Borkowski	Apha particle counting.
2,474,773	June 28, 1949	784,356	Nov. 6, 1947	W. R. Baker	Radiation detector.
2,479,271	Aug. 16, 1949	711,433	Nov. 21, 1946	F. R. Shonka	Ionization chamber circuit.
2,479,600	Aug. 23, 1949	600,401	June 19, 1945	C. J. Borkowski	Ionization chamber.
2,481,506	Sept. 13, 1949	543,701	July 6, 1944	C. C. Gamertsfelder	Fast neutron meter.
2,481,964	do	558,421	Oct. 12, 1944	E. O. Wollan	Fast neutron meter.
2,483,991	Oct. 4, 1949	580,785	Mar. 3, 1945	E. O. Wollan, L. A. Pardue, & N. Goldstein	Radiation exposure meter.
2,485,469	Oct. 18, 1949	708,204	Nov. 6, 1946	J. S. Allen & B. B. Rossi	Method and means for detecting ionization.
2,485,516	do	604,276	July 10, 1945	R. W. Thompson	Shallow plane proportional counter.
2,491,220	Dec. 13, 1949	614,402	Sept. 4, 1945	C. E. Wiegant & E. G. Serge	Neutron detector.
2,491,320	do	546,912	July 27, 1944	P. G. Koontz	Neutron detector and method of making same.
2,493,935	Jan. 10, 1950	14,854	Mar. 15, 1948	C. E. Wiegand & E. G. Serge	High energy neutron counter.
2,494,641	Jan. 17, 1950	588,053	Apr. 12, 1945	H. L. Anderson & P. G. Koontz	Radiation counter.
2,495,650	Jan. 24, 1950	603,397	July 5, 1945	J. M. Blair & J. M. Hush	Coincidence proportional counter.
2,496,886	Feb. 7, 1950	689,478	Aug. 9, 1946	E. W. Molloy & W. H. Hinch	Radiation alarm and measurement device.
2,497,823	Feb. 14, 1950	675,798	June 10, 1946	E. W. Molloy	Radiation measuring device for air filters.
2,499,830	Mar. 7, 1950	711,321	Nov. 21, 1946	do	Air proportional counter.
2,505,919	May 2, 1950	719,526	Dec. 31, 1946	J. A. Simpson	Proportional counter.
2,506,419	do	596,221	May 28, 1945	E. R. Graves	Method and apparatus for detecting ionizing particles.
2,506,435	do	39,878	July 21, 1948	B. B. Rossi & J. S. Allen	Radiation measurement.
2,514,135	July 4, 1950	79,680	Mar. 4, 1949	H. G. Neil	Radiation detector.
2,519,007	Aug. 15, 1950	72,423	Jan. 24, 1949	V. C. Wilson	Radiation counter.
2,513,805	July 4, 1950	497,343	Aug. 4, 1943	W. R. Kanne	Detecting device.
2,521,133	Sept. 5, 1950	85,668	Apr. 5, 1949	A. H. Snell & L. C. Miller	Secondary electron multiplier.
2,521,658	do	634,864	Dec. 13, 1945	E. G. Segre & O. Chamberlain	Ionization chamber.
2,531,106	Nov. 21, 1950	103,712	July 8, 1949	R. J. S. Brown & H. G. Weiss	Pocket radiation alarm.
2,532,503	Dec. 5, 1950	532,566	Apr. 24, 1944	J. J. Kennedy, W. R. Baker, & C. E. Wiegand	Electronic counting circuits.
2,532,874	do	634,862	Dec. 13, 1945	H. L. Anderson	Detection apparatus.
2,532,950	do	719,525	Dec. 31, 1946	J. A. Simpson	Air proportional counter.
2,536,991	Jan. 2, 1951	617,129	Sept. 18, 1945	E. A. Wollan & L. A. Pardue	Radiation detector.
2,538,632	Jan. 16, 1951	3,484	Jan. 21, 1948	E. R. Tompkins	Combination beta and gamma chamber.
2,550,488	Apr. 24, 1951	56,847	Oct. 27, 1948	C. R. Marsh	Radiation counter.
2,556,768	June 12, 1951	622,634	Oct. 16, 1945	J. L. McKibben	Neutron detector.
2,558,919	July 31, 1951	595,187	May 22, 1945	W. H. Zinn	Method for measuring radiation of neutrons.
2,564,626	Aug. 14, 1951	582,092	Mar. 10, 1945	A. M. MacMahon & A. H. Snell	Measuring device and method of measuring.
2,567,519	Sept. 11, 1951	11,612	Feb. 27, 1948	R. Livingston	Pressure monitoring device.
2,567,668	do	704,636	Oct. 21, 1946	J. Hecomovich	Apparatus for the measurement of radioactivity.
2,576,616	Nov. 27, 1951	116,720	Sept. 20, 1949	R. Livingston & H. A. Levy	Monitor for fission gases.
2,579,994	Dec. 25, 1951	576,124	Feb. 3, 1945	W. H. Zinn	Neutron density indicator device.
2,582,163	Jan. 8, 1952	97,657	June 7, 1949	T. A. Rich & J. E. Bigelsen	Electrometer for pocket chambers.
2,588,789	Mar. 11, 1952	595,188	May 22, 1945	W. H. Zinn	Neutron detector.
2,590,925	Apr. 1, 1952	62,541	Nov. 29, 1948	C. J. Borkowski & E. Fairstein	Proportional counter.
2,592,416	Apr. 8, 1952	776,245	Srpt. 26, 1947	A. J. Groth	Indicating device for radioactivity.
2,595,550	May 6, 1952	595,192	May 22, 1945	J. A. Simpson	Radiation counter.
2,595,622	June 6, 1952	115,234	Sept. 12, 1949	C. E. Wiegand	Fission indicator.
2,596,080	May 6, 1952	720,136	Feb. 21, 1947	J. R. Raper & R. E. Zirkle	Ionization chamber.
2,596,500	May 13, 1952	148,173	Mar. 7, 1950	E. W. Molloy	Pocket radiation alarm.
2,598,215	May 27, 1952	640,106	Jan. 9, 1946	C. J. Borkowski & R. H. Firminhac	Ionization chamber, alpha particles.
2,599,156	June 3, 1952	136,601	Jan. 3, 1950	H. W. Bousman	Thermal neutron detector element.
2,599,922	June 10, 1952	558,450	Oct. 12, 1944	W. R. Kanne	Monitoring of gas for radioactivity.

[1] Useful in connection with nuclear reactors, nuclear investigations, radiation measurement and the like.

COMMISSION-OWNED PATENTS—Continued

Nuclear reactors—Continued

SCHEDULE K—INSTRUMENTATION—Continued

Patent No.	Issued	Serial No.	Filed	Inventor	Title
2,601,583	June 24, 1952	750,468	May 26, 1947	C. O. Ballou	Radiation measuring instrument.
2,601,637	June 29, 1952	713,654	Dec. 3, 1946	J. E. Rose & E. W. Hinspater	Pocket ionization chamber.
2,604,598	July 22, 1952	127,416	Nov. 15, 1949	L. W. Mead & F. C. Armistead	Ionization chamber for neutron flux measurements.
2,605,429	July 29, 1952	184,304	Sept. 11, 1950	H. V. Herndon & R. G. Hoff	Portable radiation survey instrument.
2,606,296	Aug. 5, 1952	744,499	Apr. 28, 1947	J. A. Simpson	Radiation counter.
2,606,573	Aug. 12, 1952	67,988	Dec. 29, 1948	W. M. Brobeck & J. G. Dowrard	Adjustable venturi assembly.
2,608,661	Aug. 26, 1952	622,631	Oct. 16, 1945	W. H. Zinn	Means for measuring radiation.
2,613,327	Oct. 7, 1952	204,522	Jan. 5, 1951	A. O. Beckman, H. H. Herd & A. D. Robinson	Dosimeter.
2,616,052	Oct. 28, 1952	209,749	Feb. 7, 1951	S. L. Hurst	Fast neutron dosimeter.
2,617,946	Nov. 11, 1952	172,546	July 7, 1950	B. L. Weller	Radiation detector circuit.
2,619,601	Nov. 25, 1952	188,337	Oct. 4, 1950	L. M. Zollers	Radioactivity survey apparatus.
2,620,446	Dec. 2, 1952	184,288	Sept. 11, 1950	H. D. LeVine & H. J. Giovanni	Radiation dection and measuring means.
2,634,374	Apr. 7, 1953	228,718	May 28, 1951	F. R. Shonka	Pocket radiation meter.
2,652,497	Sept. 15, 1953	168,636	June 16, 1950	A. J. Miller	Temperature measurement.
2,656,476	Oct. 20, 1953	141,743	Feb. 1, 1950	R. H. Firminhac	Survey instrument.
2,659,013	Nov. 10, 1953	321,412	Nov. 19, 1952	D. M. Davis & J. C. Hart	Badge meter.
2,663,802	Dec. 22, 1953	261,021	Dec. 11, 1951	P. E. Ohmart	Neutron detector.
2,666,865	Jan. 19, 1954	748,433	May 16, 1947	C. J. Borkowski	Survey instrument.
2,677,772	May 4, 1954	690,801	Aug. 15, 1946	R. J. Moon	Neutron thermometer.
2,681,416	June 15, 1954	252,662	Oct. 23, 1951	B. W. Thompson	Neutron scintillation counter.
2,682,582	June 29, 1954	307,628	Sept. 3, 1952	F. R. Shonka & R. F. Selman	Contacting device.
2,682,222	July 6, 1954	243,232	Aug. 23, 1951	G. Failla & H. H. Rossi	Radiation meter.
2,685,027	July 27, 1954	682,952	July 11, 1946	L. W. Alvarez	Radioactivity measurement.
2,687,480	Aug. 24, 1954	304,952	Aug. 18, 1952	F. R. Shonka, A. J. Okleshen & F. R. Selman	Radiation measuring device.
2,700,736	Jan. 25, 1955	157,069	Apr. 20, 1950	M. O. Roberts	Method and apparatus for measuring radiation quantities.
2,714,668	Aug. 2, 1955	576,412	Feb. 6, 1945	W. H. Zinn	Radiation responsive device.
2,716,229	Aug. 23, 1955	676,602	June 14, 1946	R. F. Wehrmann & E. W. Rebol	Leak detector.
2,716,523	Aug. 30, 1955	231,735	June 15, 1951	G. E. Driver	Device for counting alpha and beta particles.
2,717,964	Sept. 13, 1955	273,488	Feb. 26, 1952	V. L. Parsegian & R. C. Maninger	Sulfur crystal counter.
2,719,823	Oct. 4, 1955	611,102	Aug. 17, 1945	W. H. Zinn	Neutronic reactor radiation indicator.
2,727,154	Dec. 13, 1955	273,485	Feb. 26, 1955	W. V. Goldsworthy	Radiation detector.
2,728,861	Dec. 27, 1955	329,032	Dec. 31, 1952	F. M. Glass	Radiation pocket screamer.
2,728,867	----do----	603,086	July 3, 1945	V. C. Wilson	Generation of power.
2,731,568	Jan. 17, 1956	241,778	Aug. 14, 1951	G. Failla	Radiation detection device.
2,731,624	----do----	362,800	June 19, 1953	D. Krucoff	Electromagnetic rod-position indicator.
2,736,817	Feb. 28, 1956	248,425	Sept. 26, 1951	P. R. Bell	Pocket radiation meter.
2,736,818	----do----	274,224	Feb. 29, 1952	F. R. Shonka	Measuring device and apparatus.
2,738,426	Mar. 13, 1956	272,488	Feb. 19, 1952	W. M. Hurst	Liquid monitoring device.
2,741,592	Apr. 10, 1956	719,372	Dec. 31, 1946	L. B. Borst & H. W. Newson	Neutronic reactor measuring and safety rod operating apparatus.

2,742,576	Feb. 17, 1956	271,568	Feb. 14, 1952	R. A. Dandl	Portable scintillation survey meter.
2,751,505	June 19, 1956	67,811	Dec. 29, 1948	H. L. Anderson	Neutronic reactor device.
2,752,508	June 26, 1956	197,000	Nov. 22, 1950	G. V. Zito	Counting rate meter.
2,753,462	July 3, 1956	384,362	Oct. 5, 1953	J. H. Moyer & H. Hurwitz	Neutron flux measuring device.
2,755,253	July 17, 1956	322,556	Nov. 25, 1952	C. O. Muehlhause & G. E. Thomas	Neutron scintillation detector.
2,761,071	Aug. 28, 1956	429,713	Mar. 13, 1954	G. S. Hurst	Fast neutron dosimeter.
2,779,876	Jan. 29, 1957	340,069	Mar. 3, 1953	C. A. Tobias & H. A. Anger	Radioactivity-distribution detector.
2,781,307	Feb. 12, 1957	732,324	Mar. 4, 1947	E. P. Wigner	Apparatus for the measurement of neutron absorption.
2,791,119	Apr. 7, 1957	574,567	Mar. 28, 1956	W. H. Zinn & J. M. Harrer	Liquid level indicator.
2,793,309	Apr. 21, 1957	705,946	Oct. 31, 1946	J. A. Simpson	Neutron proportional counter.
2,795,703	June 11, 1957	416,722	Mar. 16, 1954	I. B. Berlman & L. D. Marinelli	Apparatus for counting fast neutrons in the presence of gamma rays.
2,795,704	----do----	423,547	Apr. 15, 1954	H. Bryant, P. Forest, G. F. Erickson & S. G. Kaufman	Neutron ion chamber.
2,800,589	July 23, 1957	553,161	Dec. 14, 1955	P. W. Levy	Crystal dosimeter.
2,803,405	Aug. 20, 1957	291,354	June 2, 1952	W. D. Howell	Automatic counting apparatus.
2,822,479	Feb. 4, 1958	412,670	Feb. 25, 1954	W. W. Goldsworthy	Radiation counter.
2,823,179	Feb. 11, 1958	622,632	Oct. 16, 1945	A. H. Suell & S. K. Allison	Detection of coating failures in a neutronic reactor.
2,824,971	Feb. 25, 1958	508,366	May 16, 1955	I. F. Weeks	Neutron detector.
2,824,973	----do----	409,784	Feb. 11, 1954	J. C. Gundlach & G. C. Kelley	Radiation detection.
2,845,560	July 29, 1958	453,450	Aug. 31, 1954	C. D. Curtis, R. L. Carlson, & M. P. Tubimis	Neutron counter.
2,855,519	Oct. 7, 1958	685,356	Sept. 20, 1957	L. F. Kocher	Tamperproof film badge.
2,858,447	Oct. 28, 1958	532,810	Sept. 6, 1955	G. V. Taplin	Radiation dosimeter and dosimeter methods.
2,858,452	----do----	533,513	Jan. 10, 1957	L. F. Wouters	Radiation wave detector.
2,859,431	Nov. 4, 1958	627,519	Dec. 10, 1956	J. M. Morris	Visual alarm system.
2,852,459	Sept. 16, 1958	598,272	June 8, 1945	R. R. Williamson	Apparatus for detecting and locating presence of fluids.

Question 4. List of applications by AEC as to each of above reactor types.

Answer 4. The compilation of the AEC patent applications pertaining to various reactor types is being prepared. When the schedules are complete they will be furnished in a supplemental report.*

Question 5. List of applications by persons other than AEC in which the Commission has claimed ownership under section 152, either through negotiations with the applicant or by direction to the Patent Office.

Answer 5. The following are the applications referred to the commission under section 152 in which rights were acquired by the Government subsequent to receipt of notice under section 152:

SN 101,178 on which patent No. 2,735,016 issued: This application was reported under section 152 on December 15, 1954. AEC communicated with the owner and negotiated for Government rights and at the same time acquired rights in two other related patents Nos. 2,617,761 and 2,616,843 that had issued prior to the Atomic Energy Act of 1954.

SN 317,875 on which patent No. 2,810,850 issued: Notice under section 152 was received on April 18, 1955. Upon communication with the Air Force, the Air Force representative advised that a license was due the Air Force under a contract. The Air Force later advised of receipt of a license.

SN 389,601 on which patent No. 2,745,973 issued: Notice under section 152 received on March 2, 1955. Inquired of the Air Force if Air Force deemed they were entitled to a license under any contract. Subsequently, Air Force advised that they had acquired a Government license.

SN 508,366 on which patent No. 2,824,971 issued: Upon receipt of notice under section 152 on or about January 24, 1957, began investigation as to whether invention made under an AEC contract. Investigation not completed by April 23, 1957, and a directive was filed in the U.S. Patent Office. During the investigation discussions were held with the representatives of the contractor and after filing the directive a settlement was negotiated. The Patent Office dismissed the proceedings on October 31, 1957, pursuant to stipulation and agreement under which the patent issued to the AEC on February 25, 1958, subject to certain rights in the contractor.

SN 580,311: Receipt of section 152 notice received on June 17, 1957. Investigation was not completed by September 15, 1957, so AEC filed directive to preserve any statutory rights. As a result of extensive negotiations, a stipulated settlement was negotiated whereby AEC acquired rights in SN 580,311 and at the same time rights were settled in some five other cases. The Patent Office dismissed the proceedings on November 6, 1958, pursuant to the stipulation and agreement of settlement. The case has been remanded to the examiner for further ex parte proceedings.

SN 385,612 (Application in Issue Division of Patent Office): Notice under section 152 received December 24, 1957. Inquired of the Signal Corps, U.S. Army, and was advised that the Signal Corps deemed the Government was entitled to a license pursuant to contract. On March 6, 1958, the Signal Corps advised that a confirmatory license had been received.

*This report, when received, was marked "Official Use Only", and therefore could not be made public.

Question 6. List of all reactor applications received by the Patent Office under section 152, indicating in each case: the date of the application; the name of the applicant (and any assignees of record); the date that AEC was notified under section 151; the date AEC was notified under section 152; the title of the invention; the status of the application; and any pertinent remarks.

Answer 6. It is presumed that the question was intended to inquire into the patent applications pertaining to reactors per se that have been referred to the Commission by the Patent Office under section 152.

No applications which pertain to reactors per se have been referred to the Commission under section 152 by the Patent Office.

Question 7. List of foreign patent applications filed by AEC.

Answer 7. There are attached hereto as schedules lists of foreign applications filed from 1943 through 1958. Between 1943 and 1946 foreign applications were filed by the Manhattan District only in Canada and the United Kingdom pursuant to the memorandum agreements between Canada, United Kingdom, and United States Governments. After the Atomic Energy Act of 1946 only limited foreign filings could be undertaken. Some 256 Canadian and British applications that filed between 1943 and November 1955, were transferred to the Canadian and United Kingdom Governments pursuant to the tripartite agreement of September 26, 1956.

Schedule A: A list of foreign applications filed by the U.S. Atomic Energy Commission or its predecessor the Manhattan District from 1943 to November 21, 1958.

Schedule B: A list of foreign filings filed by contractors on contract inventions that have been reported to AEC as filed up to November 21, 1958.

SCHEDULE A.—*Foreign applications filed by AEC*

Country	1943-46	1947-55	1956	1957	1958	Total
Argentina				4	3	7
Australia		5	3	20	21	49
Belgian Congo					3	3
Belgium			2	19	33	54
Brazil				6	6	12
Canada	242	35	47	38	65	427
Denmark				1		1
France			3	22	35	60
Germany				14	24	38
Great Britain	239	29	24	40	49	381
Greece					1	1
Holland			2	16	15	33
India			1	13	17	31
Italy			1	11	9	21
Japan				11	20	31
Mexico				1	3	4
Norway				1	2	3
Portugal				2	1	3
Spain				1	2	3
Sweden				3	9	12
Switzerland				2	2	4
South Africa		7	3	11	7	28
Total	481	76	86	236	327	1,206

SCHEDULE B.—*Foreign applications reported to AEC by contractors on contract inventions*

Country	1943-46	1947-55	1956	1957	1958	Total
Australia			1	1		2
Belgium		1	2	3	1	7
Canada	26	29	5	6		66
Chile		1				1
France		2	5	5	2	14
Germany		6	4	4	2	16
Great Britain	18	23	7	6		54
Holland		5	1	1		7
Italy				2	1	3
Japan		4	6	2	1	13
Norway		5	1	1		7
Peru		1				1
South Africa		5				5
Southern Rhodesia		1				1
Sweden		4	1	2		7
Switzerland		4	2	1		7
Total	44	91	35	34	7	211

Question 8. List of awards granted under section 157.

Answer 8. There have been no awards granted by the Patent Compensation Board under the first sentence of section 157 of the Atomic Energy Act of 1954. However, since the passage of the 1954 Atomic Energy Act two dockets have been settled by AEC and orders dismissing the dockets entered by the Patent Compensation Board.

Docket No. 7 of Messrs. Glenn T. Seaborg, John W. Kennedy, Emilio Segre and Arthur C. Wahl was settled by AEC upon payment of $400,000 to the said four inventors. The Patent Compensation Board entered an order dismissing the docket on June 3, 1955, upon the filed settlement stipulation.

Docket No. 20 of Consolidated Electrodynamics Corp. was dismissed by the Board, upon stipulation of the parties that provided for payment by AEC of $40,000 to applicant. The Patent Compensation Board dismissed docket No. 20 on June 30, 1958, with prejudice pursuant to the stipulation filed by the parties.

Under section 11 of the Atomic Energy Act of 1946, the Patent Compensation Board granted an award on November 20, 1951, of $7,500 to Cyril E. McClellan in docket No. 4.

Two other dockets filed under the 1946 Atomic Energy Act were settled and the Patent Compensation Board entered an order dismissing the proceedings upon stipulation of the parties prior to passage of the 1954 act.

Dockets No. 2 and No. 11 of G. M. Giannini & Co. were settled by the AEC upon payment of $300,000 to G. M. Giannini & Co. and the inventors, Messrs. Enrico Fermi, Edoardo Amaldi, Oscar d'Agostino, Bruno Pontecorvo, Franco Rasetti, Giulio Cesare Trabacchi, and Emilio Segre. The Board entered an order dismissing the two dockets on June 29, 1953, upon the filed settlement stipulation.

The Commission, pursuant to the second sentence of section 157 of the 1954 Atomic Energy Act, established an award on November 10, 1954. It later became known as the Enrico Fermi award.

The first award, in the sum of $25,000, was given to Dr. Enrico Fermi on November 16, 1954.

There have been three recipients of the award in the sum of $50,000 since it became known as the Enrico Fermi award. The first such award was given to Dr. John von Neumann on April 26, 1956, the

second to Dr. Ernest O. Lawrence on December 2, 1957, and the third is being presented to Dr. Eugene P. Wigner on December 2, 1958.

Question 9. Brief summary of organization, personnel, and functions of Patent Branch of AEC General Counsel's Office, both headquarters and field offices.

Answer 9. The U.S. Atomic Energy Commission patent organization is a unit of the Office of the General Counsel under the Patent Branch of that Office. The control and coordination of inventions, patents, copyrights, and trademark activities as well as the general responsibility for patent activities under the 1954 Atomic Energy Act are under the direction of the Chief of the Patent Branch who is responsible to the General Counsel.

The organization comprises a headquarters office designated as the Patent Branch of the Office of the General Counsel and branch offices at 6 separate locations which presently staff a total of 38 professional employees including patent attorneys, patent and technical advisers, and patent engineers. Approximately 19 of the professional employees are engaged in the preparation and prosecution of patent applications. The remaining 19 professional personnel are substantially exclusively occupied with other patent matters, including those pertaining to negotiation of patent and copyright provisions of contracts, the handling of applications for reasonable royalties, just compensation or awards under section 153 of the 1954 Atomic Energy Act, investigation of patent infringement claims, patent clearance of contracts, investigation of patent applications referred to the Commission under sections 151 and 152 of the 1954 Atomic Energy Act, negotiation of licenses and the issuance of licenses, the reporting of potential inventions, patentability investigations and determinations, determinations of conflicts between inventors, the preparation and handling of interferences before the Board of Interference Examiners, and the preparation and presentation of appeals before the Board of Appeals of the U.S. Patent Office, and the administration of the Invention Secrecy Act (35 U.S.C. 181–H6).

Question 10. Brief summary of procedures followed by AEC in requiring reports by contractors as to inventions of their employees.

Answer 10. At the time that the Chief of the Patent Branch is advised of the consummation of a contract, assignment of the responsibility for the handling of patent matters under the contract is made to one of the field patent groups or to the central office, depending largely on the work to be performed by the contractor. The field group or central office having responsibility for the establishing of procedures with the contractor's representatives which, with variations to meet the desires of the contractor, generally follow the procedures below:

Contractors are requested to report inventions and discoveries on AEC Form 213 "Record of Invention" or on the contractor's form if the contractor already has a company form which sets forth similar information. The original and one copy of such invention form, together with a disclosure describing the subject invention in more detail, is forwarded by the contractor to the local patent group or to the Patent Branch, Washington, depending upon assignment of patent investigation of the particular contract. At the time of reporting the contractor is usually requested to advise if the contractor desires to file domestic or foreign patent applications on the subject docket.

If the contractor desires to file a U.S. patent application, he is requested to furnish the date on which the U.S. filing will be accomplished. If the contractor does not desire to file, he is requested to furnish advice as to any known prior art as well as the extent of utilization of the subject matter of the invention or discovery on project work. The local patent group reviews the submitted disclosure and may on its cognizance of the existence of prior art or other bases close out an individual docket. If the local patent group does not inactivate a docket, the disclosure with a report setting forth any known prior art, related project art, or project use, together with other data and recommendations are forwarded to the Patent Branch, Washington, for necessary action.

Where the prime contract extends over a period of years and extensive research and development is conducted, there is close coordination between patent group personnel and the contractor's patent personnel as to inventions and discoveries to be reported. In addition to the receipt of invention reports the patent group having patent responsibility for a contract is the recipient of the technical reports and memoranda considered under the contract. The reports are reviewed and if items are uncovered which have not been reported a communication is sent to the contract representative inquiring as to such unreported items.

In addition, periodic field trips are made to prime contractor sites for "on site" discussions with contractor patent representatives and engineers to ascertain potential new inventions and discoveries and ascertain internal procedures for receiving and handling invention reports. In instances where there are research and development subcontracts, the responsibility for review of the subcontractors' work is undertaken either directly by the local patent group or the central office and procedures similar to that for the handling of prime contract inventions are established with the subcontractors.

The prime contractor may participate in the reporting of inventions by the subcontractors either by receiving the initial reports from the subcontractors or by the receipt of copies of the reports to the AEC patent group from the subcontractors. The system for the processing of subcontract inventions is otherwise similar to that outlined above for processing of prime contract inventions.

AEC Report to Senate Subcommittee on Patents, Trademarks and Copyrights

Acknowledgment

The material furnished by the Atomic Energy Commission in response to Senator O'Mahoney's letter of October 9, 1958, was assembled for the use of the Subcommittee on Patents, Trademarks, and Copyrights of the Senate Judiciary Committee in a forthcoming report by that subcommittee. This report will be one of a series describing the current patent practices of each of the Government agencies dealing with inventions, which the Patent Subcommittee is presently preparing.

The Joint Committee on Atomic Energy wishes to express its appreciation to the Patent Subcommittee for its cooperation in making this material available, and for its continuing efforts to obtain and

publish the data as to Government agencies' patent practices which is needed to formulate legislative policy as to patent rights.

CONGRESS OF THE UNITED STATES,
SENATE COMMITTEE ON THE JUDICIARY,
October 9, 1958.

Hon. JOHN A. MCCONE,
Chairman, Atomic Energy Commission,
Washington, D.C.

DEAR MR. CHAIRMAN: The Subcommittee on Patents, Trademarks, and Copyrights has been making an extensive study of the current policies and practices relative to the administration of U.S. Government-owned patents to determine whether or not a revision of these policies and practices would better serve the Government's and the public's interests. In that connection, I would appreciate receiving answers to the questions set forth below. It is my understanding that you are presently involved in a study regarding your patent practices and policies; therefore, any additional information or comments which you might wish to submit for consideration by the subcommittee will be greatly appreciated.

A. A statistical breakdown by years of the patents obtained, applied for, and owned by your Department.

B. A statement of the administrative organization within the Commission that deals with patent policies and practices:

(1) The number of employees handling the preparation of patent applications.

(2) The number of employees handling licensing and other related matters.

C. A statement of the extent to which the patented inventions held by the Commission are used commercially.

(1) Give significant specific examples of useful inventions made by the Commission.

D. In regard to those patents owned by the Commission which have been licensed for commercial use, please supply a listing of these patents, the products involved, the names and addresses of the licencees, terms of the licences, and the date on which the licenses were executed.

E. A statement of the existing policy of the Commission concerning rights (both domestic and foreign) in inventions and patents in relation to the following:

(1) Employees.
(2) Contracts.
  (*a*) Procurement.
  (*b*) Research and development.
(3) Grants.
(4) Independent inventors.

F. Has the Commission ever run into any areas of major difficulty in contracting due to its patent policy?

G. A statement of the Commission's policy with respect to obtaining or acquiring technical information, know-how, specialized processes, and proprietary rights other than patents developed under:

(1) Contracts:
  (*a*) Procurement.
  (*b*) Research and development.
(2) Grants.

H. A statement with respect to the patents and the classes of patents which the Commission waives its claim to title and the circumstances under which the Commission deems it appropriate to waive the Government's ownership.

I. A statement whether title ownership to patents has proven useful to the Government or in the public interest and to include—

(1) offset.
(2) counterclaims.
(3) interference suits.
(4) interchange with foreign countries.

J. Does the Commission make applications for patents in foreign countries?

(1) If the Commission does not seek foreign patents, what are the factors which caused the Commission to adopt this policy?

K. Has the Commission ever purchased, acquired or sold any of its patents or patent rights or granted exclusive licenses for a period of years? If so, give details.

L. Does the Commission attempt to enforce its patent title of ownership by injunction, suit for infringement, or by other means?

M. In how many instances has the procedure to determine conflicts of ownership set out in 42 U.S.C. 2182 been invoked? Detail the results of each instance and whether the Commission has found the use of the Board of Patent Interferences of the Patent Office sufficient and adequate for the purpose.

N. Has any patent ever been revoked because it was useful solely in the utilization of special nuclear material or atomic energy in an atomic weapon? Has the Commissioner of Patents been able to fulfill his requirement under 42 U.S.C. 2181(e)?

O. Has the Commission ever held hearings to determine whether a patent is affected with the public interest? Has the Commission ever declared a patent to be affected with the public interest and issued nonexclusive licenses of use under this patent? If the Commission has not, why hasn't it?

P. A statement of the number of licenses issued under 42 U.S.C. 2183(c), the administrative operation of sections 2183(c)–(f) of title 42 of the United States Code, and what are the standard specifications and the terms of the licenses granted under Commission findings as authorized by sections 2183(b) or (e)?

Q. A statement of specific instances in which a different patent policy might have proven useful to the Government or in the public interest.

(1) Examples of such usefulness or public interest may include the following:

(*a*) Stimulation of invention.
(*b*) Stimulation and encouragement of commercial development.
(*c*) An income source to the Government.

R. Please supply copies of any studies or surveys made during the past years relating to the feasibility of attempting new policies and practices with respect to patents owned by the Commission.

S. A statement of the operational history of the Commission's Patent Compensation Board.

T. A statement of the administrative operation of the Commission's awards program, awards given, total amounts awarded per year,

amount of savings to government, relationship of the Commission's award program to sections 2121–2123 of title 5 of the United States Code and Executive Order No. 9817. Does the Commission award employees of other Government departments and facilities and non-governmental employees for significant contributions to advancement of nuclear science? If not, do you agree that you do have the necessary authorizing legislation?

Your cooperation in this matter will be greatly appreciated.

With kind regards.

Sincerely yours,

JOSEPH C. O'MAHONEY, *Chairman.*

PATENT POLICIES AND PRACTICES IN THE U.S. ATOMIC ENERGY COMMISSION FROM AUGUST 1, 1946, THROUGH NOVEMBER 1958

The following replies are made in response to the inquiry of October 9, 1958, from the chairman of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, U.S. Senate.

A. A statistical breakdown by areas of the patents obtained, applied for, and owned by your Department.

The following breakdown shows U.S. patent applications applied for, U.S. patents obtained, and U.S. patents owned by the U.S. Atomic Energy Commission. The figures for the years prior to August 1, 1946, reflect the action of the predecessor, Manhattan District, Corps of Engineers, War Department, and the special project (S–1) of Office of Scientific Research and Development:

	U.S. patent applications applied for	U.S. patents obtained	U.S. patents owned [1]
1942	14		
1943	74		
1944	319		
1945	531		
1946:			
To Aug. 1	291	1	1
Aug. 1 to Dec. 31	145		
1947	282	13	13
1948	225	33	32
1949	203	47	54
1950	234	139	139
1951	203	166	166
1952	244	146	146
1953	274	113	118
1954	268	123	133
1955	265	139	145
1956	253	250	260
1957	260	252	253
1958, to Nov. 15	206	379	379
Total	4,291	1,801	1,838

[1] Title in United States. Licenses of one nature or another may have been retained by the contractor.

In view of the time delay between the filing of application and the issuance of patent hereon, there is, of course, no direct correlation between the number of applications filed and the patents issued in a given year. Prosecution time is ordinarily between 3 and 4 years where there is no classification involved and in classified cases the

time between the filing of the application and the issuance of a patent may be a much longer period.

B. A statement of the administrative organization within the Commission that deals with patent policies and practices.

(1) The number of employees handling the preparation of patent applications.

(2) The number of employees handling licensing and other related matters.

The U.S. Atomic Energy Commission patent organization is a unit of the Office of the General Counsel under the Chief of the Patent Branch of that Office. The control and coordination of inventions, patents, copyrights, and trademark activities as well as the general responsibility for patent activities under the 1954 Atomic Energy Act are under the direction of the Chief of the Patent Branch who is responsible to the General Counsel.

The organization comprises a headquarters office designated as the Patent Branch of the Office of the General Counsel and branch offices at 6 separate locations which presently staff a total of 38 professional employees including patent attorneys, patent and technical advisers, and patent engineers. Approximately 19 of the professional employees are engaged in the preparation and prosecution of patent applications. The remaining 19 professional personnel are substantially exclusively occupied with other patent matters, including those pertaining to negotiation of patent and copyright provisions of contracts, the handling of applications for reasonable royalties, just compensation or awards under section 153 of the 1954 Atomic Energy Act, investigation of patent infringement claims, patent clearance of contracts, investigation of patent applications referred to the Commission under sections 151 and 152 of the 1954 Atomic Energy Act, negotiation of licenses and the issuance of licenses, the reporting of potential inventions, patentability investigations and determinations, determinations of conflicts between inventors, the preparation and handling of interferences before the Board of Interference Examiners, and the preparation and presentation of appeals before the Board of Appeals of the U.S. Patent Office, and the administration of the Invention Secrecy Act (35 U.S.C. 181–H6).

Question C. A statement of the extent to which the patented inventions held by the Commission are used commercially.

(1) Give significant specific examples of useful inventions made by the Commission.

It is believed that Commission patents have made a significant contribution to American industry in a number of fields. This view is supported by schedule A and schedule B, as attached in item D, which respectively give the names of those companies to whom a nonexclusive, royalty-free license has been issued upon request and those which retained a license under the contract under which the invention arose.

Commission patents relating to technological advances and know-how, developed under programs supported by the Commission and/or its predecessors, the Manhattan Engineer District and Office of Scientific Research and Development, have provided the foundation for and contributed to the unhindered and rapid development of a competitive industrial position in a number of different fields. One of these fields relates to radiation dosimeters, detectors, discriminators,

and particle counters, as well as the associated electronic components and circuitry. Of the many patents in this category (number of patents here is probably between 100 or 200) a few of particular note are 2,483,981; 2,531,106; 2,596,500; 2,634,374; and 2,682,510.

Fundamental research on boron compounds carried out in connection with studies on possible isotope separation techniques resulted in important developments in the chemistry of the borohydrides (thus contributing to the production of some of today's high specific energy rocket fuels). Patents of interest are 2,461,661; 2,461,662; 2,461,663; 2,494,968; and 2,545,633.

The selection of uranium hexafluoride as the volatile substance to be used in the separation of the isotopes of uranium necessitated the engineering development of a suitable electrolytic process for production of fluorine on a large scale, as well as the development of methods of handling, container materials, pumping systems, and the like, in order to safely and successfully utilize this very active, corrosive, chemical substance. See, for example, patents 2,422,590; 2,506,438; 2,504,248; 2,540,960; 2,544,285; 2,564,024; and 2,598,283.

The desirable nuclear, physical, and chemical properties of zirconium metal as a useful material of construction for certain nuclear reactor purposes led to the development of improved methods for extraction from ore, separation from hafnium, and production of high quality metal as well as alloys. Some of the patents in this field are 2,546,953; 2,566,665; 2,567,661; 2,635,937; and 2,705,674.

The necessity for handling varying amounts of more or less highly radioactive materials has resulted in an extensive development of highly specialized remotely controlled manipulative devices. These devices are covered by patents 2,476,249; 2,595,134; 2,632,574; 2,764,301; 2,771,199, and others.

One of the outstanding developments stemming from the atomic energy program is establishment of an industrial scale of hydrometallurgical methods for the processing of various types of ores to separate and recover such metal values as uranium, vanadium, thorium, and the separated rare earths. Uranium ore processing plants utilize anion exchange resins for the recovery of a high grade uranium product. Significant patents are 2,743,159 and 2,743,154.

In the case of certain types of ores, the preferred method of uranium recovery is by solvent extraction. Patents of interest here are 2,859,092; 2,859,094, and 2,860,031. Solvent extraction and ion exchange processes are also playing a significant role in the recovery and separation of other raw materials of interest, such as thorium, certain rare earths, columbium, and niobium. Important patents in this respect are the following: 2,523,892; 2,539,282; 2,564,241; 2,636,044; and 2,796,320.

Question D. In regard to those patents owned by the Commission which have been licensed for commercial use, please supply a listing of these patents, the products involved, the names and addresses of the licensees, terms of the licenses, and the dates on which the licenses were executed.

Answer D. Schedule A* is a list of the presently owned Commission patents on which nonexclusive, revocable, royalty-free licenses in all fields have been accorded to the licensee upon written request.

*For schedule A, see pp. 70 through 85.

Schedule B* is a list of the presently owned Commission patents on which contractors retained one or more type of license pursuant to the terms of the contract or upon request at the time of the execution of the assignment of the title to the Commission. This schedule has an additional column in which the type of license is identified. The type of licenses are identified as:

Type B: The license retained is a nonexclusive, irrevocable, royalty-free license sometimes for all purposes, sometimes for atomic energy purposes only, some may include the right to grant sublicenses in specific fields, and in others, as is the case of the United Kingdom and Canadian Governments' licenses, they are a nonexclusive license for governmental and mutual defense purposes pursuant to the terms of the Tripartite Agreement of September 1956.

Type C: The license retained is a sole license, with the sole right to grant sublicenses for specific nonatomic energy purposes or for purposes other than use in the production or utilization of special nuclear material or atomic energy. The license may also include a nonexclusive license for other purposes.

Question E. A statement of the existing policy of the Commission concerning rights (both domestic and foreign) in inventions and patents in relation to the following:

(1) Employees.
(2) Contracts:
  (*a*) Procurement.
  (*b*) Research and development.
(3) Grants.
(4) Independent inventors.

The existing policy of the Commission concerning domestic and foreign rights in inventions and patents is as follows:

1. As to employees

The Commission has pursued a policy of securing an agreement from employees, advisors, and consultants covering inventions made or conceived by such personnel during employment or engagement under which the Commission determines the disposition of rights in and to any inventions or discoveries and any domestic or foreign patents that may result. Generally, the Commission has acquired all rights, both domestic and foreign, in inventions or discoveries pertaining to atomic energy. Where the inventions or discoveries pertain to and have uses in other fields, the Commission on the facts of each case has employed equitable principles to determine the rights in fields other than atomic energy.

2. As to contracts

(*a*) *Procurement.*—In the procurement of standard supplies and commodities or in construction contracts, the Commission has not usually acquired rights in inventions or discoveries. The Commission has employed indemnity provisions in such instances under which the contractor indemnifies the Government as to infringement occuring in the performance of or arising out of the use or disposal of supplies or equipment furnished.

(*b*) *Research and development.*—The Commission has employed patent provisions in its research and development contracts under which the Commission is in position to acquire all rights in inventions and discoveries made or conceived by contractor employees. If the

* Schedule B, see pp. 86-97.

research and development pertain to a nonatomic field where the contractor has an established industrial and patent position, the contractor may, depending on the circumstances, retain a nonexclusive or sole license for purposes other than use in the field of atomic energy. In addition to rights in inventions made or conceived in the course of, in connection with, or under a contract, the Commission may acquire a license for Government use of background patents. For instance, where a contractor operates a plant or facility and incorporates certain company-patented subject matter in the plant, the Commission has acquired a license for the Government use of such patented subject matter so as to be in position to continue the operation of the plant or facility after termination of the contract.

3. Grants

In connection with grants to a nonprofit educational institution, the grantee agrees to grant to the Government a nonexclusive, irrevocable, royalty-free license for governmental purposes in and to any invention or discovery resulting from the use of equipment or materials purchased under the grant.

4. Independent inventors

In the absence of any contract arrangement or relationship, the Commission acquires no rights in inventions of independent inventors. However, the Commission may negotiate for rights pursuant with independent inventors in circumstances where the patent is such as to warrant the acquisition of rights by the Commission.

Question F. Has the Commission ever run into any areas of major difficulty in contracting due to its patent policy?

The Commission has not run into any major difficulty in contracting due to its patent policy.

Question G. A statement of the Commission's policy with respect to obtaining or acquiring technical information, know-how, specialized processes, and proprietary rights other than patents developed under:

(1) Contracts:
  (*a*) Procurement.
  (*b*) Research and development.
(2) Grants.

1. Contracts

(*a*) *Procurement.*—In the ordinary purchase order for "off-the-shelf" purchases no specific provisions are incorporated for acquiring technical information, know-how, secret processes and proprietary rights. The Commission acquires the ordinary descriptive and operating instructions in such purchases. Where there is a special type of procurement, specific provisions may be included requiring the furnishing of specific technical data, instruction and operating manuals, reproduction rights, etc., in connection with equipment or supplies furnished.

(*b*) *Research and development.*—In research and development contracts the Commission incorporates a provision under which all drawings, sketches, designs, notebooks, technical and scientific data, reports, findings, memorandums of every description, etc. are subject to inspection by the Commission and are the property of the Government to be delivered to the Government and used by the Government as it sees fit.

2. Grants

Grantees are required to submit reports to the Commission within 1 year of acceptance of grant, detailing use of funds supplied and summarizing the educational and training program undertaken in connection with the material or equipment supplied by the Commission.

Question H. A statement with respect to the patents and the classes of patents which the Commission waives its claim to title and the circumstances under which the Commission deems it appropriate to waive the Government's ownership.

As pointed out in answer to item E, the Commission acquires the rights in inventions made or conceived by employees or contractor employees in the course of, in connection with, or under contracts of employment or for research and development. When inventions have uses in fields other than atomic energy, as noted in reply to item E the contractor may, depending on circumstances, retain a nonexclusive or sole license for purposes other than use in the field of atomic energy.

On the assumption that inquiry pertains to classes of situations where the Commission may have waived its rights under the provisions of section 152 of the 1954 act be advised that the Commission has to date issued two general waivers under section 152, as follows:

1. The Commission has waived rights under section 152: (a) as to inventions or discoveries resulting from the use of source materials, special nuclear materials, radioactive and staple isotopes, disposed of or sold in accordance with certain established prices and use charges and (b) in and to inventions or discoveries resulting from irradiation services made available in accordance with certain general established prices and charges, all as more fully set forth in part 80, title 10 of the Federal Code of Regulations.

2. The Commission has also waived its rights as respects inventions or discoveries made or conceived in connection with or resulting from access to restricted data pursuant to, as set forth in part 25.23(b), title 10 of the Federal Code of Regulations.

In addition to the foregoing general waivers, the General Counsel of the Commission issued a formal opinion on February 1, 1956, that a license issued by the Commission is not deemed to be a contract, arrangement or other relationship with the Commission as those terms are used in section 152 of the Atomic Energy Act of 1954. Hence, the mere fact that an invention or discovery is made in the course of activities authorized by a license would not give the Commission right under section 152 to such an invention or discovery.

Question I. A statement whether title ownership to patents has proven useful to the Government or in the public interest and to include:

(1) Offset.
(2) Counterclaims.
(3) Interference suits.
(4) Interchange with foreign countries.

1. Offset; 2. Counterclaims

The Commission has not been involved in the Court of Claims or district court on any matter where it would be in position to use its patents in offset or counterclaims. However, in connection with negotiated settlements for alleged infringement, the Commission has considered its ownership of patents in the same field as an offset or

counterclaim, although the party requesting the royalties may have refused to recognize the Government-owned patent by way of offset or counterclaim. In one instance the Commission asserted several patents as being infringed by the company claiming Commission use of its patents. However, the company refused to recognize that it infringed any patents but in the settlement for one-quarter of the original amount of requested royalty the Commission took into consideration the Commission-owned patents. If settlement had not been negotiated the Commission would have pleaded its patents as a defense by way of counterclaim. In applications for award under section 157 of the Atomic Energy Act, the Commission has pleaded its inventions on patents as items to be taken into consideration by the Patent Compensation Board.

3. Interference suits

The Commission has not been involved in any interference suits. However, in connection with interference proceedings in the U.S. Patent Office, the Commission has acquired licenses in some 19 applications involved in the interferences by mutual exchange of licenses in settlement of such interferences. In addition, the Commission has secured concession of priority of invention in favor of the Government in some 16 interferences on which 12 U.S. patents have issued and on which 4 applications are, at present, awaiting issue.

4. Interchange with foreign countries

By virtue of the Commission ownership of patents in the United States, United Kingdom and Canada, the Commission was in position to negotiate the Tripartite Agreement of September 24, 1956, under which the United States acquired rights in United Kingdom-owned U.S. patents, patent applications filed prior to November 15, 1955, and Canadian-owned U.S. patents and patent applications filed prior to November 15, 1955, subject to a nonexclusive license to such governments. Under such agreement the United States assigned certain U.S.-owned United Kingdom and Canadian patents and patent applications to the United Kingdom and Canadian Governments subject to a royalty-free license in the U.S. Government. The agreement further assured nondiscrimination by those governments in the according of any licenses under the patents.

Furthermore, the Commission policy of the acquisition of domestic and foreign patents has been instrumental in securing commitments in the Euratom Agreement of 1958 as respects the joint research and development to be performed thereunder. The agreement provides that the United States acquire a nonexclusive license, with the right to grant sublicenses, for all purposes in inventions made by the Euratom Community and member states in the joint research and development program and any foreign patents issued thereon as well as acquire ownership of any U.S. patents resulting from the joint research and development program subject to a nonexclusive license with the right to grant sublicenses in the member states of the Euratom Community.

Question J. Does the Commission make applications for patents in foreign countries?

(1) If the Commission does not seek foreign patents, what are the factors which caused the Commission to adopt this policy?

The Commission has followed the practice of filing patent applications in foreign countries on subject matter deemed of sufficient importance to warrant filing in foreign countries. The Commission has filed some 1,100 foreign patent applications.

Question K. Has the Commission ever purchased, acquired or sold any of its patents or patent rights or granted exclusive licenses for period of years? If so, give details.

The Commission, in settling the claim of G. M. Giannini & Co. in June 1953 for the sum of $300,000, secured a release of all claims for past infringement and acquired all right, title, and interest U.S. Fermi Patent 2,206,634.

The Commission, in 1953, acquired a nonexclusive, royalty-free license in Christofilos U.S. Patents 2,531,028 and 2,567,907 in addition to certain rights in several pending patent applications for the sum of $10,000.

The Commission acquired a license for certain of its activities as respects Patents 2,450,462 and 2,587,575 and in reissue letters patent in 23464 in April 1958 upon payment of royalties in the sum of $40,000 in settlement of the claim of Consolidated Electrodynamics Co.

In addition to the foregoing the Commission has, in certain circumstances, acquired a non-exclusive license in background patents in inventions of contractors at the time of the negotiation of a contract for research and development work.

The Commission has not sold any patents or patent rights or granted any exclusive licenses for a period of years. The Commission has pursued the policy of granting nonexclusive, royalty-free licenses on patents owned by the Commission and has accorded licenses as set forth in schedule A to item D. Commission contractors have retained either a nonexclusive or sole license in nonatomic energy fields as listed in notation in schedule B to item D.

The Commission has also acquired rights in patents as set forth in the response to item I.

Question L. Does the Commission attempt to enforce its patent title of ownership by injunction, suit for infringement, or by other means?

The Commission has not attempted to enforce by injunction, suit for infringement or other means its patent rights except as set forth in response to item I.

Question M. In how many instances has the procedure to determine conflicts of ownership set out in 42 United States Code 2182 been invoked? Detail the results of each instance and whether the Commission has found the use of the Board of Patent Interferences of the Patent Office sufficient and adequate for the purpose.

Up to November 21, 1958, the Commission had filled directives pursuant to section 42 United States Code 2182 in two instances:

In the first instance, the Commission received notice under section 2182 on or about January 24, 1957. The Commission on April 23, 1957, filed a directive in the U.S. Patent Office. Subsequently a settlement was negotiated and the Patent Office dismissed the proceedings on October 31, 1957, pursuant to the filed stipulation and agreement under which Patent 2,824,971 subsequently issued to the Commission on February 25, 1958.

In the second instance, the Commission received notice under section 2182 from the Patent Office on or about June 15, 1957. Since

the Commission's investigation was not completed by November 15, 1957, AEC filed a directive to preserve any statutory rights. As a result of extensive negotiations a settlement was agreed upon whereby AEC acquired rights in the particular application and at the same time acquired rights in some five other pending applications. The Patent Office dismissed the proceedings on November 6, 1958, pursuant to a filed stipulation and agreement and the particular application was remanded to the examiner for further ex parte agreements.

In several other instances after referral of the patent application to the Commission by the Commissioner of Patents pursuant to section 2182 the Government has acquired rights without filing a formal directive.

Question N. Has any patent ever been revoked because it was useful solely in the utilization of special nuclear material or atomic energy in an atomic weapon? Has the Commissioner of Patents been able to fulfill his requirement under 42 United States Code 2181(e)?

To the Commission's knowledge no patent has ever been revoked because it was useful solely in the utilization of special nuclear material or atomic energy in an atomic weapon.

It is presumed that in the second question of the item the statutory reference intended is 42 United States Code 2181(d) since there is no section (e). It is believed that the Commissioner of Patents has been in position to reasonably fulfill the provision of section 2181(d) recognizing that due to the thousands of patent applications filed in the Patent Office each month and the fact that a determination as to subject matter must be made in each instance before referral, there is room for oversight and error. It is believed that if further information as to this item is desired the same might be presented to the Commissioner of Patents for his opinion.

Question O. Has the Commission ever held hearings to determine whether a patent is affected with the public interest? Has the Commission ever declared a patent to be affected with the public interest and issued nonexclusive licenses of use under this patent? If the Commission has not, why hasn't it?

The Commission has never held hearings to determine whether a patent is affected with the public interest. The Commission has never declared a patent to be affected with the public interest and therefore has never had occasion to issue any nonexclusive licenses under such a patent.

There has been no occasion as respects the Commission's operation and that of its contractors which would necessitate the taking of action under section 2183 and no person of the groups designated has ever made application for exercise by the Commission of the authority of section 2183.

Question P. A statement of the number of licenses issued under 42 United States Code 2183(c), the administrative operation of section 2183(c)–(f) of title 42 of the United States Code, and what are the standard specifications and the terms of the licenses granted under Commission findings as authorized by section 2183 (b) or (e)?

There have been no licenses issued by the Commission pursuant to 42 United States Code 2183(c). There has been no administrative experience with respect to operation of sections 2183(c)–(f) of title 42, United States Code, since no patents have been declared affected with the public interest.

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The procedures for declaring a patent affected with the public interest are set forth in part 2 (subsec. pt. C) and part 81 of title 10, Code of Federal Regulations. The specifications and procedures and the terms of licenses under section 2183 (b) or (e) are set forth in part 2 (subsec. pt. C) and part 81 of title 10 of the Code of Federal Regulations.

Question Q. A statement of specific instances in which a different patent policy might have proven useful to the Government or in the public interest.

(1) Examples of such usefulness or public interest may include the following:

(*a*) Stimulation of invention.

(*b*) Stimulation and encouragement of commercial development.

(*c*) An income source to the Government.

No instances are known where a different patent policy might have proven useful or in the public interest. Since industrial corporations generally acquire the rights in inventions made by employees it is believed that in most instances the individual inventor's incentives are not any less or greater by reason of the fact that the Commission acquires the rights instead of the contractor. The captive inventor secures the same benefits from his inventions whether he is employed on an AEC contract or on other company work as the Commission approves and reimburses the contractor for granting any honorariums to its employee inventors for inventions arising out of Commission contracts.

Under the express directives of the Congress set forth in the Atomic Energy Act of 1954, as respects widespread disclosure of technological development the ownership by the Government has permitted of the widest possible dissemination of unclassified scientific data and technology and the unfettered use of inventions by all interested persons and not just contractors.

The Commission has adopted the general Government policy of according nonexclusive, royalty-free licenses on Commission-owned patents. The Commission has not considered patents as a source of income.

Question R. Please supply copies of any studies or surveys made during the past years relating to the feasibility of attempting new policies and practices with respect to patents owned by the Commission.

No studies or surveys have been made in the last several years relating to the feasibility of attempting new policies and practices with respect to patents owned by the Commission.

Question S. A statement of the operational history of the Commission's Patent Compensation Board.

The Atomic Energy Commission Patent Compensation Board is a three man board established originally pursuant to section 11c of the Atomic Energy Act of 1946 and presently constituted under section 157a of the 1954 Atomic Energy Act. The rules of procedure for Patent Compensation Board proceedings are incorporated in part 80 of title 10 of the Code of Federal Regulations. The general procedures and practices before the Patent Compensation Board are similar to those followed in patent actions in the Federal district courts.

Seventeen applications were filed under the Atomic Energy Act of 1946 and an additional 16 applications have been filed since August 30, 1954, the effective date of the act of 1954, making in all a total of 33 applications filed to date. The Patent Compensation Board issued orders dismissing the proceedings in four applications on the basis of filed stipulated settlement agreements. The Board has, to date, after full hearings, denied awards in 11 applications and granted an award of $7,500 in one application. Eleven of these decisions have been printed in U.S. Patent Quarterly Reports. One application was withdrawn after the filing of the response by the Office of General Counsel. In the remaining pending applications, the parties have submitted proposed findings in 2, final hearings have been held in 3, and the remaining 11 are pending on preliminary pleadings or motions.

Question T. A statement of the administrative operation of the Commission's awards program, awards given, total amounts awarded per year, amount of savings to Government, relationship of the Commission's award program to sections 2121–2123 of title 5 of the United States Code and Executive Order No. 9817. Does the Commission award employees of other Government departments and facilities and nongovernmental employees for significant contributions to advancement of nuclear science? If not, do you agree that you do have the necessary authorizing legislation?

The policies and procedures of the AEC incentive awards program are the "Incentive awards" and "Special AEC honor awards." The program is decentralized to operations offices and administered through local awards committees which provide services for managers of operations. A central awards committee provides services for the headquarters office and acts on awards beyond the authority of the local committees. The manual chapters incorporate the policies and requirements of the Government employees' incentive awards law of 1954 (title 5 U.S.C. secs. 2121–2123) and the Civil Service Commission regulations which were promulgated pursuant to that law.

Awards are made to AEC employees for (1) suggestions; (2) superior performance; (3) special acts or services; and (4) distinguished or outstanding service.

Suggestion awards are given for constructive ideas submitted by an employee or a group of employees. To be eligible for such an award, a suggestion must be outside the employee's area of responsibility or, if within his job responsibility, must be so superior or meritorious as to warrant special recognition. Managers of operations are authorized to make case awards up to $500 for suggestions involving tangible savings, and up to $300 for suggestions involving intangible benefits.

Superior performance awards are granted to individuals or groups for achievements which exceed the position requirements. Eligibility criteria for such superior performance awards are established and managers of operations are authorized to make awards up to $300.

Special act or service awards are granted for specific identifiable achievements of a meritorious nature, such as an act of heroism involving voluntary risk of life or personal safety in attempting to prevent loss of life or substantial loss of property. Managers of operations are authorized to make such awards up to $300.

Distinguished and outstanding service awards are honorary awards granted for such service to the Atomic Energy Commission. Eligibility criteria for such awards are established and the AEC Awards

Committee makes recommendations to the general manager for the granting of such awards.

The following table shows the amount awarded per fiscal year and the savings realized.

	Fiscal year 1955	Fiscal year 1956	Fiscal year 1957	Fiscal year 1958
Awards	$3,565	$26,365	$42,950	$28,555
Savings	49,823	234,621	68,973	201,043

In connection with the inquiry concerning awards to employees of other Government departments and nongovernmental employees, it is pointed out that the Commission has established an award under the authorization of section 157(c)3 of the Atomic Energy Act known as the Enrico Fermi Award.

The first award under the second sentence of section 157(c)3 was in the sum of $25,000 and was granted to Dr. Enrico Fermi on November 16, 1954. Later this award became known as the "Enrico Fermi Award" and the amount increased to $50,000. There have been three recipients of this award:

Dr. John von Neumann on April 26, 1956.
Dr. Ernest O. Lawrence on December 2, 1957.
Dr. Eugene P. Wigner on December 2, 1958.

In addition, AEC contractors normally operate suggestion systems which grant awards to their employees for beneficial ideas adopted. Awards made by cost-type contractors are normally included as items for which reimbursement is authorized by the AEC. Policies and practices for granting such awards vary depending upon the individual contractor but are subject to AEC general approval and authorization.

Other than for the special awards provided for in section 157(c) such as the Fermi Award and the Patent Compensation Board claim awards, the Commission does not have authority to grant awards directly to non-Government employees.

Miscellaneous Correspondence With Patent Office

U.S. Department of Commerce,
U.S. Patent Office,
Washington, November 5, 1958.

Mr. Edward Diamond,
Associate General Counsel,
Atomic Energy Commission, Washington, D.C.

Dear Mr. Diamond: This will acknowledge receipt of your letter of November 4, 1958, seeking our opinion with respect to a request by the Joint Congressional Committee on Atomic Energy for access to copies of patent applications and statements transmitted to the Atomic Energy Commission by the Commissioner of Patents, pursuant to section 152 of the Atomic Energy Act of 1954 (42 U.S.C. 2182).

In our present view, if such a request were made to the Patent Office, the recommendation would be that it be refused. Section 122 of title 35 U.S.C. has been considered to be a legislative directive to the Patent Office not to give any information concerning patent ap-

plications to anyone, other than the applicants or the owners, except under the conditions specified in the section. While section 152 of the Atomic Energy Act provides an exception to the general provisions of 35 U.S.C. 122, insofar as the Atomic Energy Commission is concerned, neither that section nor any other section of the act is considered to require the Commissioner to grant the same access to the Joint Committee. Whether the sentence in section 202 of the Atomic Energy Act, stating that the Commission shall keep the committee "fully and currently informed with respect to all of the Commission's activities," requires the Commission to afford the committee access to the material forwarded by the Commissioner, is a question on which we cannot and should not express an opinion. Without knowledge of the Commission's prior practices and its relationship with the committee in this field and related fields, it would be presumptuous on our part to express an opinion on the propriety of your granting the request of the committee for such material.

Sincerely yours,

C. W. MOORE, *Solicitor.*

NOVEMBER 7, 1958.

Mr. ROBERT C. WATSON,
Commissioner, U.S. Patent Office,
Department of Commerce, Washington, D.C.

DEAR MR. WATSON: As you know, the Joint Committee has undertaken a study of atomic energy patent policies and procedures, and a review of chapter 13 of the Atomic Energy Act of 1954 pertaining to patents and inventions. On October 7, 1958, a meeting was held in the office of Mr. Arthur W. Crocker, First Assistant to the Commissioner, during which a member of the Joint Committee staff outlined the objectives of this study which the staff is carrying out in accordance with instructions from Vice Chairman Anderson and myself. In connection with this study, it is requested that the Patent Office provide access to the Joint Committee staff to certain applications for patents on inventions or discoveries useful in the production or utilization of special nuclear material or atomic energy. Section 151d of the act provides that access shall be granted to the Atomic Energy Commission, and I believe that it will be necessary for the committee also to have access and perhaps copies of certain applications in order to complete its study. Mr. David R. Toll, our staff counsel, and Mr. Bernard Wohlfert, consultant to the committee for the purposes of this study, will come to the Patent Office next week for this purpose, on or about November 17, 1958, and I request that you cooperate with them in every respect.

In addition, it is requested that the Patent Office forward to the Joint Committee a list of all applications for patents on nuclear reactors by persons other than AEC, indicating in each case, the date of the application, the name of the applicants and any assignees of record, the title of the invention, the status of application, and any other pertinent remarks. This information is being requested in accordance with section 202 of the Atomic Energy Act of 1954 which provides as follows:

"Any Government Agency shall furnish any information requested by the Joint Committee with respect to the activities or responsibilities of that agency in the field of atomic energy."

The cooperation of the Patent Office is appreciated.

Sincerely yours,

CARL T. DURHAM, *Chairman.*

U.S. DEPARTMENT OF COMMERCE,
PATENT OFFICE,
Washington, December 9, 1958.

Mr. ROLAND A. ANDERSON,
Chief, Patent Branch, Atomic Energy Commission,
Washington, D.C.

DEAR MR. ANDERSON: In accordance with prior arrangements acknowledged in a letter of November 20, 1958, from Mr. Edward Diamond, I am forwarding herewith a list of all applications for patents on nuclear reactors by persons other than the Atomic Energy Commission. The list is accompanied by an explanatory memorandum prepared by Mr. R. C. Campbell, Acting Examiner, Division 46, who supervised the preparation of the list.

This list was requested by Representative Carl T. Durham, chairman of the Joint Committee on Atomic Energy, and it is understood that the Atomic Energy Commission will make the list available to the Joint Committee on Atomic Energy and its staff, pursuant to section 202 of the Atomic Energy Act of 1954, as amended.

Thank you for your cooperation in this matter.

Sincerely yours,

ARTHUR W. CROCKER,
First Assistant Commissioner.

U.S. DEPARTMENT OF COMMERCE,
U.S. PATENT OFFICE,
Washington, December 9, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D.C.

DEAR MR. DURHAM: In further reference to your letter of November 7, 1958, and in accordance with prior arrangements with the Atomic Energy Commission, acknowledged in a letter of November 20, 1958, from Mr. Edward Diamond, associate general counsel, I am transmitting to Mr. Roland Anderson, Chief, Patent Branch, Atomic Energy Commission, a list of all applications for patents on nuclear reactors by persons other than the Atomic Energy Commission. The list is accompanied by an explanatory memorandum prepared by Mr. R. C. Campbell, Acting Examiner, Division 46, who supervised the preparation of the list.

It is my understanding from Mr. Diamond's letter that the above list will be made available to members of the Joint Committee on

Atomic Energy and its staff, pursuant to section 202 of the Atomic Energy Act of 1954 as amended.

Sincerely yours,

ARTHUR W. CROCKER,
First Assistant Commissioner.

MISCELLANEOUS CORRESPONDENCE WITH AEC

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
December 16, 1958.

Mr. A. R. LUEDECKE,
General Manager, U.S. Atomic Energy Commission,
Washington, D.C.

DEAR MR. LUEDECKE: By letter dated December 9, 1958, Mr. Arthur W. Crocker, First Assistant Commissioner of the Patent Office, informed Chairman Durham that he was transmitting to Mr. Roland Anderson, Chief, Patent Branch, AEC, a list of all applications for patents on nuclear reactors by persons other than the AEC, together with explanatory memorandum. Mr. Crocker further stated that it was his understanding that the list would be made available to members of the Joint Committee and its staff, and Mr. Crocker indicated that he had sent a copy of his December 9, 1958, letter to Mr. Edward Diamond and Mr. Roland A. Anderson.

It is requested that the Atomic Energy Commission forward to the Joint Committee two copies of the list of applications and the memorandum forwarded by Mr. Crocker's December 9, 1958, letter.

Sincerely yours,

JAMES T. RAMEY, *Executive Director.*

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., January 13, 1959.

Mr. JAMES T. RAMEY,
Executive Director, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. RAMEY: Your letter of December 16, 1958, crossed in the mail my letter of December 18, 1958, to Chairman Durham, transmitting the list of patent applications pertaining to nuclear reactors by persons other than the Atomic Energy Commission, which had been received from Mr. Arthur W. Crocker, First Assistant Commissioner of Patents with his letter of December 9, 1958.*

I assume that my letter of December 18 meets your needs. If not, please advise me.

Sincerely yours,

A. R. LUEDECKE, *General Manager.*

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* The list was marked "Official Use Only", and therefore could not be made public by the Joint Committee.

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., November 24, 1958.

Mr. DAVID TOLL,
Counsel, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D.C.

DEAR MR. TOLL: Pursuant to your request of November 13, 1958, there is enclosed herewith a copy of Mr. Mitchell's opinion of February 1, 1956, that licenses issued by the Commission are not within the purport of section 152 of the 1954 Atomic Energy Act.

The general waivers issued by the Commission under section 152 are incorporated in the Code of Federal Regulation, the one applicable to sale and distribution of isotope and the conduct of irradiation services is set forth in part 83, and the second applicable to access permits is contained in part 25.23.

There is also enclosed a copy of the Manager, Chicago Operations Office, letter of February 12, 1958, to Dr. Chauncey Starr of North American, which presumably is the letter Mr. Koris of North American advised you had been sent to his company.

Sincerely yours,

ROLAND A. ANDERSON,
Chief, Patent Branch.

Enclosure: Mr. Mitchell's opinion, letter of February 12, 1958 to Dr. Starr.

Copies to Chairman, Congressional Liaison, 2.

OPINION OF THE GENERAL COUNSEL

Inquiries have been received as to the applicability of the provisions of section 152 of the Atomic Energy Act of 1954 (68 Stat. 944) to inventions or discoveries made or conceived in the course of activities under licenses issued by the Atomic Energy Commission.

In my opinion a license issued by the Atomic Energy Commission is not a "contract, subcontract, arrangement or other relationship with the Commission" as those terms are used in section 152 of the act. Hence, the mere fact that an invention or discovery is made by a licensee in the course of activities authorized by a license would not give the Commission rights under section 152 with respect to such invention or discovery. On the other hand, if a licensee has entered into a "contract, subcontract, arrangement or other relationship with the Commission," inventions or discoveries made or conceived by the licensee under the contract or other relationship would come within the purview of section 152.

As used in this opinion, "license" means a license issued pursuant to chapters 6 ("Special Nuclear Material"), 7 ("Source Material"), 8 ("Byproduct Material") or 10 ("Atomic Energy Licenses") of the Atomic Energy Act of 1954, or a construction permit issued pursuant to section 185 of the act.

Dated February 1, 1956.

WILLIAM MITCHELL,
General Counsel, U.S. Atomic Energy Commission.

FEBRUARY 12, 1958.

Dr. CHAUNCEY STARR,
Vice President, North American Aviation, Inc.,
Canoga Park, Calif.
(Through A. P. Pollman, Area Manager, Canoga Park area office).

DEAR DR. STARR: In your letter of October 14, 1957, to Mr. J. C. Pollard, Assistant Manager of the Commission's San Francisco Operations Office, you requested the AEC's views regarding patent rights which might arise out of the performance of certain non-Government work in your privately owned facilities.

Your question concerns the applicability of section 152 of the Atomic Energy Act of 1954 to inventions or discoveries made in the course of performance of privately financed work for others which your company proposes to conduct in its privately owned facilities at the same time that it will be performing work in those facilities under contract with the Commission. Under section 152, any invention or discovery, useful in the production or utilization of special nuclear material or atomic energy, made or conceived under any contract, subcontract, arrangement, or other relationship with the Commission, regardless of whether the contract or arrangement involved the expenditure of funds by the Commission, shall be deemed to have been made or conceived by the Commission, except that the Commission may waive its claim to any such invention or discovery under certain circumstances. We do not believe that the mere fact of physical juxtaposition of privately financed work performed for others with work performed under contract with the Commission would in itself constitute such an arrangement or other relationship; nor would inventions and discoveries under the privately financed work performed for others be deemed, by virtue of such juxtaposition alone, to have been made in connection with or under the terms of the contracts with the Commission which were performed concurrently.

We have not considered whether an "arrangement or other relationship" might exist where other factors beside physical juxtaposition, such as the use of AEC facilities for the private work, are present. Nor have we considered the effect of interchange of personnel working on the AEC-sponsored activities and personnel working on private work, or the interchange of ideas between such personnel, upon establishing the Commission's rights in an invention or discovery in a particular case. Needless to say, the existence of factors such as these, or conceivably others, might well be pertinent in the resolution of the respective rights of the parties, and nothing in this letter should be construed as expressing an opinion in derogation of the rights of the Government in such instances.

This reply has the approval of the Acting General Counsel of the Commission.

Very truly yours,

KENNETH A. DUNBAR, *Manager.*

Copies to Edward Diamond, Acting General Counsel, Washington; W. Kenneth Davis, Director, Division of Reactor Development, Washington; A. P. Pollman, area manager, Canoga Park area office; William E. Elliott, San Francisco Operations Office; Earl G. Kunz, Assistant General Counsel, Chicago Operations Office; George H. Lee, Director, Patent Division, Chicago Operations Office.

CHAPTER VI. EXCERPTS FROM AEC MEETING OF APRIL 15, 1958, INCLUDING STATEMENTS FROM REPRESENTATIVES OF INDUSTRY AND OTHER GROUPS

Mr. DIAMOND (AEC Associate General Counsel). I will ask Mr. Anderson, Chief of our Patent Branch and whom you all know, to outline the Commission's policies and practices in this field.

And now the first item on our agenda, "AEC Patent Policies and Practices."

Mr. Anderson.

Mr. ANDERSON. Mr. Diamond, members of the Panel, gentlemen, the present Atomic Energy Commission patent policy had its origin in the 1940 directive of President Roosevelt to Dr. Vannevar Bush to the effect that controls of patents on the special project (S–1) was necessary to assure the fullest wartime cooperative effort to advance the atomic energy program. The resultant contract provisions provided for the Government's acquisition of the rights in the technical data developed, and the right to determine the disposition of the title to and the rights in inventions and discoveries resulting from Government-sponsored research and development work.

This policy was continued under the Manhattan Engineer District, Department of the Army, and has been pursued under the Atomic Energy Acts of 1946 and 1954 through the employment in contracts of patent provisions generally referred to as the type A, B, and C provisions. This policy has permitted the Atomic Energy Commission and the Government generally complete freedom of action as respects the dissemination of technological atomic energy information prepared and developed under Government contracts to the entire public, in the public interest, and not just to contractors or other selected groups. It likewise has made it possible for the Commission to make available to all citizens and industries discoveries and inventions in the atomic energy field, thereby avoiding the granting of special privileges and establishment of preferred positions by its select contractors.

It is seriously questioned whether the Commission, under the directives and mandates of the 1954 Atomic Energy Act, could pursue any other policy. The Commission is charged, in section 1 of the 1954 Atomic Energy Act, with the development of atomic energy for peaceful uses as well as military uses, and to provide a program for conducting, assisting, and fostering research and development work in order to encourage scientific and industrial progress.

The Commission has the specific statutory obligations under section 3 to disseminate unclassified technical data; to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes; and to provide to cooperating nations the benefits of peaceful applications of the atom.

If the Commission, on Government-sponsored work, did not acquire the rights to disseminate, reproduce, and use technical data as the Commission sees fit, or acquire the right to make such inventions and discoveries available to all, could it fulfill these directives of the Congress?

The AEC has been able to establish the technical information services for the distribution and publication of unclassified technical data and provide for the civilian-access program because it has had full freedom of action as to the reproduction and use of inventions and technical information, and not merely governmental rights as respects the discoveries and inventions and the technical data.

It has been asserted by some organizations and individuals that the Defense Establishment policies of merely securing a nonexclusive licence for Government use on Government-sponsored research and development work should be followed by the Commission. The Defense Establishment has no legislative directives as to the dissemination of technological data as does the Commission as noted in the referenced section 3. The Defense Establishment is engaged in military research and development work and has no statutory responsibility to promote civilian research and development work.

It is thus to be appreciated that the Commission has broader responsibilities in the field of atomic energy than the Defense Establishment has in the field of military research. While the adoption of the Defense Establishment policies might satisfy the Government interests, it would not advance the civilian scientific and industrial progress to the extent of the directive of the Atomic Energy Act of 1954. In fact, various committees and groups in and out of the Congress have questioned whether the Defense Establishment policy of only securing a license in the Government is in the best interest of the Government, to say nothing as to whether it is in the best public interest.

Is not the public interest in civilian application of atomic energy best served by widespread dissemination of technological information and the extensive use of the technology and inventions developed with public funds?

Furthermore, the Congress, in section 159, provides that—

> Nothing in this Act shall affect the right of the Commission to require that patents granted on inventions, made or conceived during the course of federally financed research or operations, be assigned to the United States.

In fact, in section 152 the Congress directs that inventions arising out of Commission contracts are the property of the Government unless the Commission waives its claim to such inventions or discoveries under appropriate circumstances. No criteria or standards for waivers are set forth to guide the Commission, other than providing that the Commission may waive rights to such inventions under appropriate circumstances.

An observation as to the present effect of the Commission policy on the civilian atomic energy program might be apropos at this point. Every company at present engaged in private atomic energy is entitled to utilize not only the technology and scientific information developed and the inventions made and conceived by such company under contract, but also entitled to utilize the technical information prepared and inventions made and conceived by inventors of other companies under Commission contracts. This utilization of technology would

not be possible under a program that provided for the acquisition by the Government of a mere right to use the technological information and inventions for governmental purposes. This freedom of exchange and use has prevented the withholding of technology or the acquisition by a few corporations or a group of preferred corporations of the resultant patents.

The cross-fertilization of ideas among and between all contractors and all strata of scientific and engineering personnel has been possible. One engineer is not denied the right to discuss his invention until the idea has been proved by the particular contractor. Any patent secured on his invention is for the benefit of all, not just the Government and the contractor. One concrete example of where the cross-fertilization has been very profitable in the atomic energy program is the raw material field.

The several processes employed today by the private corporations treating ores were developed by and for the AEC, yet the whole industry is using these processes and the downward price revisions are not affected by charging for the technology by royalty payments.

Some may deem that the time has passed when a few selected contractors are in position to secure preferential treatment either in respect to technology or from patents by virtue of being contractors. It is believed that the basis for preferred positions still prevails. While the AEC may have thousands of contractors, both large and small, in the atomic energy field most of the programmatic research and development is performed by relatively few contractors.

The national laboratories and production facilities operated on behalf of AEC are of necessity limited to a few by virtue of physical site: a national laboratory at Brookhaven, one at Oak Ridge, one at Los Alamos, one at Arco, one at Argonne, et cetera. Similarly, this is the case with the production facilities; one contractor operates Hanford, one Savannah River, one Portsmouth, one Sandia, one Oak Ridge, et cetera.

Today approximately 90 percent of the inventions reported under Commission contracts are reported by some 14 contractors. Thus, so far as inventions reported under AEC contracts are concerned, there is still concentration in a relatively few contractors. The nature of certain of the technology is such that one corporation engages only in one type of research or development. This is the case in reactor research; for example, one or two corporations are working on PWR, two on BWR, the same on OMR, HRE, et cetera.

Initially, much was said about atomic energy being a unique field and that special considerations warranted the patent policy that has been pursued on the AEC program. That unique and special considerations are still pertinent in the atomic energy field is evidenced by the recent indemnity legislation by the health-hazards problems, et cetera. The monetary expenditures required to engage in the reactor construction and operation field of necessity permit of only a small number to participate.

In addition, from the reports of Atomic Industrial Forum and the recent testimony of industry before the Joint Committee, it appears that the Government will bear a reasonable portion of the expense of research and development in the atomic energy field for some time to come.

The international picture must also receive attention in considering any patent policy. The President's Atoms for Peace program involves many countries and has thus far pertained largely to governmental arrangements involving industry and governments under bilateral agreements, Euratom and the International Atomic Energy Agency, et cetera. All of these look to government financing of some kind.

Consquently, assurances that provide American industry against foreign discrimination, and at the same time protect American industry generally abroad as well as in the United States, seem important objectives. Thus far, because of the AEC policy, the United States was in a position to secure all rights in the United States in U.S. patents of certain foreign governments.

For example, in the United Kingdom-Canadian-United States Tripartite Agreement of 1956, the United States acquired the rights in United Kingdom- and Canadian-owned U.S. atomic energy inventions that were the subject of filed patent applications as of November 15, 1955. At the same time, the AEC was able to receive assurance of equal treatment of American industry by the United Kingdom and Canada as respects United Kingdom and Canadian patents owned by such governments, as well as secure free U.S. Government rights in such countries. If the Commission has not had the title and rights in the inventions, this would not have been possible. The United States would not have had a quid pro quo with which to negotiate such an arrangement.

It is believed the tripartite agreement was the first U.S. Government exchange of patent rights where the U.S. Government did not have to pay royalties for acquiring rights in the U.S.-owned patents of foreign governments, and at the same time was able to insure nondiscrimination against American industry in their operations abroad that involve a use of the subject patents.

The patent aspects of the foreign atomic energy program is only a small part of the foreign picture. Sometimes a U.S. contractor will speak of protecting the contractors' foreign rights; however, many U.S. contractors do not themselves have foreign manufacturing plants but deal with foreign companies and arrange for a division of rights between the foreign and U.S. companies. In the field of atomic energy, this could result in situations where American industry generally would be precluded from entering foreign countries by virtue of some limited arrangement between the U.S. contractor and his particular foreign affiliate.

The Commission has followed the practice of having contractors, when reporting inventions, indicate whether they desire to file in the United States or foreign countries. If the invention does not involve classified subject matter, and the contractor has expressed a desire, the Commission has promptly notified the contractor to proceed to file the United States and any foreign applications the contractor desires.

In instances where restricted data is involved, foreign applications, of course, have only been filed by the contractor or the Commission where the subject matter involved falls within the scope of information exchangeable under an agreement for cooperation negotiated under section 123 of the Atomic Energy Act of 1954, and where it has been ascertained that the subject matter is of sufficient importance to war-

rant the filing in a foreign country. In those instances where a contractor indicates that foreign filing would be desirable, but that its rights in the invention or discovery under its contract with the Commission are not sufficient to justify the contractor itself in so filing, the Commission has ordinarily made the foreign filing after review of the subject matter. Where an invention or discovery is privately developed as distinguished from work under a Commission contract, there are no restraints on foreign filings by private industry except in those instances where classification is involved; and even where the invention or discovery has some classified aspects, the Commission has attempted to work with private industry to prepare a specification which could be filed on an unclassified basis. The Commission has pursued and is pursuing a vigorous domestic and foreign patent program.

The AEC has secured the right to determine the disposition of rights in inventions of AEC personnel as well as that of contractors. In pursuance of this policy AEC has, when private personnel are loaned to AEC facilities, placed such personnel under the same patent arrangement as personnel of the AEC and the site contractor. This has been done to have all the personnel at a given site on the same basis so as to avoid questions of loyalty to one company over another and avoid preferential treatment of selected personnel. If all participants have the same invention rights and obligations, communication between personnel and laboratories are not impeded, preferential treatment and positions are avoided and the rights and contributions are equally available to all.

Let us now review some of the statutory patent provisions of the Atomic Energy Act of 1954 that have been the subject of critical comment. The basic assumption of many commentators is that there should be no different treatment of the atomic energy subject matter from any other patentable subject matter and that any modifications of the patent statutes are not warranted. Certain of the fears of some of the proponents of the 1946 and 1954 Atomic Energy Acts may not have matured. However, the provisions of these acts and the AEC contract policy and statutes bar abuses so that today there exists freedom of action not only within the Government but in industry in the use of inventions developed at public expense, and in the use of technological information resulting from Government-sponsored research and development work.

Proposals have been made to the Congress for repeal of the patent provision of the Atomic Energy Act of 1954, so as to return atomic energy to the normal patent system. What does this embrace? Does this include the securing of an injunction against a private reactor operator because the reactor may infringe some privately owned patent?

It certainly would. Under the normal patent system, the two principal attributes of a patent are:

(1) The right by the owner of the patent to exclude others from using the invention, and

(2) The right of the owner to reasonable monetary return for use.

The Court of Claims Act precludes a patent owner from excluding the Government and its contractors from using a private patent. In other words, a patent owner cannot, in view of said act, secure an injunction against the Government's use. The sole remedy of the

patent owner against the Government is just compensation for the use by the Government.

The Atomic Energy Act of 1954, section 153, creates in the Government certain additional powers as respects atomic energy patents issued on applications filed before September 1, 1959. The Commission, on its own initiative or at the request of certain persons acting under Commission authorizations, may request that a patent be declared affected with the public interest, with the owner thereafter being limited to monetary return and not being entitled to injunctive relief.

The authority under section 153 is not necessary for the Government's own operations, for as noted, injunctive relief is not available against the Government under the Court of Claims Act, irrespective of the field of the invention. However, one departure from normal patent systems in the atomic energy field is the denial under section 153 of the injunctive relief against private parties where the Commission finds after hearings and determines that the patent is of such primary importance that licensing under the particular circumstances is necessary. This means that injunctive relief may not be available against the private power reactor owner or operator who must spend millions to build and operate a reactor.

Should the patent owner have the right to secure an injunction closing a private reactor powerplant, thereby inconveniencing the public who secure their power or electricity and other services from such powerplant?

Does it do violence to justice and equity in this type of circumstances where primary importance has been determined and the patent owner has refused to license at a reasonable royalty, to require licensing at a reasonable royalty fixed by the Commission and the courts?

Some maintain section 153 is not necessary, for patentees, if the civilian uses were important, would grant licenses. If the patentee licenses uses, section 153 will not have to be employed. But, if a patentee refuses, and the civilian use is important, then what?

Will the public interest best be served by the repeal or continuance of the authority granted in section 153?

To date the Commission has not exercised the power granted under section 153. However, private power reactors are only in the formative state and the Government, as pointed out, does not need to exercise the authority as respects its own uses.

As noted, some espouse the repeal of the entire patent provisions, while others only direct attention to certain provisions of chapter 13 in general terms, without discussing or comparing the differences between the patent sections of the Atomic Energy Act, and what is asserted to be the normal patent provisions.

Are the differences substantive? Are they major or minor? What purpose do they serve? Let us examine some of the other sections in relation to the general picture.

Section 151 a and b exclude weapons, as defined in section 11d, from patenting. We are asked why not permit patents in this limited weapons field and let the owners sue the Government in the Court of Claims for any Government use?

Basically, it is believed secrecy was a primary consideration. Secrecy and the problem as to compensation to a weapons inventor may warrant continuance of the exclusion. If a weapons device is

useful, it would in all probability be classified and remain classified so that no patent would issue for years. The weapons inventor could not sue in the Court of Claims until he secured a patent, and when he did get a patent and sued in the Court of Claims, if the Government pleaded secrecy, the inventor-patentee would have no recourse for, under existing decisions, the Court of Claims will not entertain jurisdiction where the Government asserts secret use. Thus the inventor-patentee is without relief.

However, the Congress, when it came to atomic weapons while excluding patenting of weapons inventions under section 151 a and b, provided in section 157b(3) that such a weapons inventor who reported his invention might file an application for an award, and the Government cannot in such proceeding hide behind secrecy to defeat an award. Just how the securing of a delayed patent at considerable expense with no remedy, where secret material is involved, would stimulate weapons development more than the reporting of the invention at nominal expense under section 151c with the right thereafter to secure an award under section 157b(3) is a bit difficult to appreciate. To an atomic weapons inventor, return to the normal patent system would mean no recovery where the Government pleaded secrecy. Yet this is the position that several large industrial associations advocate.

Section 151 c and d are felt by some to be unduly burdensome and by others to be ambiguous, and still others deem the provisions unclear as to the time of reporting or the penalty for noncompliance. The purpose of section 151 c and d in retrospect appear to be twofold; first, to inform the Commission of private technology, and second, to assure secrecy review of inventive subject matter.

If a U.S. patent application is filed, secrecy review may be undertaken pursuant to section 181 of title 35, United States Code. However, if no application is filed, then the report does accord the Commission an opportunity to examine the subject matter for security. In view of the few areas of subject matter at present requiring classification, the work involved in handling and processing reports may not alone justify the provisions of section 151c. However, the information obtained both from reports and patent applications are deemed to warrant continuance, aside from security considerations.

It is recognized that definiteness is most desirable, particularly in statutory language. The phraseology of section 151c calling for reports as to inventions "useful in the production or utilization of special nuclear material or atomic energy" is a term of art in the statute. The requirement is circumscribed by providing that the report is not due until 90 days after completion or after the person first "has reason to believe" that such invention or discovery is useful for such purposes. Completion is said to be ambiguous. However, it is not any more indefinite than such terms as "conceived," "reduced to practice," "finished," or some other term. Thus, even if the section is considered to be ambiguous as to subject matter or finite term has been proposed that would accomplish the desired purposes.

There is no limitation as to the use to be made of section 151c reports. The Commission at present treats the reports and applications in a "business confidential" status and, so far as known, no publication has been made of any section 151c reports or any section

151d patent applications. They are handled as "business, confidential." Provision could be made that the Commission treat these items as confidential, but as yet no definitive proposal has been recommended. There is no specific penalty provision in section 151 itself. However, the pattern for both civil and criminal penalties are set forth in the act.

Section 157b(3) provides that a prerequisite to making an application for an award is compliance with the provisions of section 151c. Thus a civil penalty is clear. If one is going to file for an award, he must have complied with section 151c by filing a timely report with the Commission or filed a timely patent application.

The criminal provisions of section 223 provide:

"Whoever willfully violates, attempts to violate, or conspires to violate" any provision of the act "for which no penalty is specifically provided" shall upon conviction be fined or imprisoned. Since there is no specific criminal provision applicable to section 151, it would seem this omnibus provision applies. If this is a matter of real concern, a specific clarifying criminal penalty provision could be added. However, it is deemed that the problem, if any, under section 151 c and d are believed to be minor in nature.

The reports by the Commissioner of Patents under section 151d evidence an ever-increasing interest and activity in the atomic energy field by private parties and industry. In the calendar year 1955 the Commissioner reported approximately 150 cases to the AEC, in 1956 approximately 450, and in 1957 over 850. The number of invention reports submitted under section 151c also have increased from year to year.

Section 152 was incorporated in the 1954 act after a great deal of controversial debate involving its effectiveness as against compulsory licensing, section 153, and also after statements that contractors were withholding the reporting of inventions. No standards to guide the Commission are set forth. However, there were several general situations where waivers under section 152 were warranted and the Commission by regulation has waived patent rights; namely,

(1) As to inventions resulting from the sale, distribution, or use of isotopes, including the Idaho gamma facilities, regulations, title 10, part 83, and,

(2) As to inventions resulting from access permits, regulations, title 10, part 25, 23b.

In a third type of situation involving inventions made by a Commission licensee, an opinion of the General Counsel was issued February 1, 1956, Regulations, title 10 (F.R., pt. 8), to the effect that licensees were not within the purview of section 152.

There may be other situations that warrant general waiver treatment; however, other than in the foregoing three general situations, it has not become specifically apparent. It has been generally understood that the patent clauses of contracts supersede the provisions of section 152.

The difficulty, if any, in connection with contracts is not in determining if a waiver exists as to a given invention, but is one of origin, to determine if an invention is "made or conceived in the course of, in connection with, or under a contract."

A waiver of section 152 as respects inventions made or conceived under contract would not resolve this issue of origin, but, insofar as it would allay fears, a waiver that the "Commission waives rights to

inventions arising in the course of, in connection with, or under a contract, except to the extent rights are reserved or determined by the contract provisions" might be expedient.

Representative Cole at the last session of the Congress introduced H.R. 600, subsequently incorporated in H.R. 5694. The AFC position was that the changes proposed in section 152 might be helpful to clarify the definitions by eliminating "arrangements and relationships," but substituting "contracts and subcontracts, expressed or implied" might add ambiguities. The AEC recommended deletion of the phrase "express or implied," as the expression "implied" contracts might add as much confusion as it was hoped it would eliminate.

The AEC also recommended that there should be added after subcontracts the phrase "entered into with the Commission or for the benefit of the Commission," as the AEC did not itself negotiate subcontracts.

The statement called for under present section 152 requires that applicants state the full facts surrounding the making or conception of the invention. What constitutes the full facts is up to the Commissioner of Patents to determine. The more complete and detailed the information submitted to the Commissioner of Patents, the less chance there is that the AEC will request additional information, or that the AEC will file a directive.

The applicant should consider, in submitting the statement, what facts he would desire if the determination were to be made by him. Has section 152 served a useful purpose?

The first information received by the Commission as respects some 20 inventions made under various contracts was when the Commissioner of Patents referred the applications to the AEC with the statements when the applications were otherwise in condition for allowance. The contract provisions provide for the prompt reporting of inventions. In these instances, the contractor had not reported the invention although the patent applications had been on file over a year. In these 20 instances, the matter was settled upon inquiry of the contractor, and only in two instances has the AEC filed a directive under section 152.

Section 155 was apparently incorporated to make available for use by the Patent Office the voluminous technical information that was under secrecy at the time of passage of the 1954 act. It was provided that secret information should be used to bar a patent the same as if public. The position of the Patent Office as respects this section is not clear. If interpreted to be authority to permit use of secret knowledge or use in the same sense as "known or used" under section 102(a) of title 35 United States Code, it means that official secrecy does not vitiate against the use of such data by the Patent Office. In fact, private undisclosed use, that is secret private use, has been employable to defeat a patent unless the use was experimental.

Representative Cole proposed an amendment in H.R. 600, incorporated in H.R. 5694, to limit the use to Technical Information Service publications. However, as pointed out in the Commission comments on H.R. 5694, Omnibus bill containing the provisions of H.R. 600, other publications by the Commission and its contractors were as authentic as Technical Information Service publications. Patent applications on file were even more provable as to dates, and

actual reduction to practice, although secret, were likewise equally provable and these should all be employable, so that the proposed restriction might not be deemed as preferable as the present language.

The Commission has followed a policy of according nonexclusive licenses to all citizens upon request, and has granted over 700 licenses on the 1,450-odd patents owned by the Commission.

The AEC regulations governing the issuance of licenses under section 156 are set forth in part 81 of 10 CFR. What is the benefit of such licensing over an outright dedication?

It has been expressed by several small companies that the reasons they secure licenses are to mark a product "patented." Others have said that if they get a license they have certain psychological advantages in marketing and will not be criticized by some other agency or party for operating in violation of patented rights. While all of this could be said to be of nebulous value, the according of licenses is following the established practice in dealing with patented subject matter, and why therefore do something different in this respect by virtue of Government ownership?

It is well established that foreign governments and their agencies license, often for royalties, and sometimes even grant exclusive licenses.

The Commission has authority under sections 161(g) and 156 to sell, license, and dispose of patents owned by the Commission. Should the Commission grant nonexclusive licenses on a royalty basis or grant exclusive licenses?

There would be problems involved in any such undertaking, but if a flat percentage royalty charge were made for all, or if exclusive limited licenses were granted after advertisement on the best terms to the Government, possibly the U.S. Government could be as effective in recoupment as the foreign governments have been not only in their own countries but in foreign countries.

The system for royalties, just compensation, and awards provided in section 157 has been rather completely and comprehensively discussed in various journals and articles. The Patent Compensation Board procedures are set forth in regulations part 80 of title 10, Code of Federal Regulations. The decisions of the Board have been published in the U.S. Patent Quarterly. Notice of the filing of claims is published in the Federal Register.

Briefly, the royalty and compensation provisions are similar to the relief in the Court of Claims or district courts. The award system under section 157b(3) is a limited and restricted system for special types of awards. There are two classes of awards established by section 157b(3). The first sentence establishes an award which is not an ex gratis award or honorarium, but one as to which all defenses available in an infringement action are employable, section 157c, and which is subject to judicial review as a matter of right, section 189b. The second sentence provides for the meritorious award which is now generally referred to as the Fermi Award. This is an honorarium.

This résumé of the sections of the Atomic Energy Acts concludes the presentation of status of the patent sections of the Atomic Energy Act of 1954 and the objectives of the present patent policies and practices of the Commission thereunder.

Mr. DIAMOND. Thank you, Mr. Anderson.

At this point I am going to depart from our agenda and call upon Mr. Ooms of the Commission's Patent Advisory Panel, and ask him to say a few words about the Panel, just what its goal is and also why we have called upon the Panel to have their members attend this meeting.

Mr. OOMS. Thank you, Mr. Diamond.

Gentlemen, I am very much pleased to have a chance to say why we are here. We are not representing anybody, but we have been asked by the Commission to come and to listen to every comment and direction that is suggested here, and to finally give the Commission, at the conclusion of this hearing, in the submission of any comments that industry want to make, an unbiased and objective opinion as to what should be done under the circumstances.

As you may recall, Mr. Dienner and I have been with the Patent Advisory Panel since it was created in 1947, right after the 1946 act. If any apology is needed, we did not write the 1946 act. It was a fine piece of draftsmanship. We did write something in 1947 and that was a report on the patent activities up to that time of the Manhattan District and its predecessor, the OSRD special project, and what was known as the 1-year operation of the Commission, and that report was distributed at the Cleveland meeting of the American Bar Association in 1947. It created some comment.

The difficulty at that time was really formulating the policy in this field was that all of us were working more or less in the dark. Nobody really knew what the potentialities of this business were. Everybody thought it was a secret and could be maintained as a Government monopoly and had to be maintained as a Government monopoly for an unmeasured time to come.

Since that time there have been a great number of changes, as everybody knows. The secret has disappeared. Classification has been reduced to almost an absolute minimum. There has been a very active participation by industry, some of it a little more optimistic than the facts apparently warranted, and now we have this tremendous international movement both by industry and the Government with, strangely enough, in addition to all the foreign governments taking active patent programs in this field, three international agencies, Euratom, the IAEA, each of them having statutes or constitutions with patents provisions in them.

I read in the paper this morning that Mr. Cole read that the IAEA will set up its own research laboratory very soon. There has been far more intimate interest in it by industry than anybody might have appreciated 10 years ago.

We are here in a completely independent role. I think some people think I am somewhat biased. If so, I have had a long and intimate connection with American industry, so if I have any bias, charge it to that, but I am sure you are going to get an independent provisional report from this group.

What the Commission will do with it, of course, will be up to the Commission.

There are several things that everybody must bear in mind. However, when you attack a policy as fundamental and of as wide interest as the patent policy is in this field, that is, the Commission has absolutely no free hand. Congress has absolutely no free hand. What

you have here is a very complex problem in which Congress has to attempt to work out a satisfactory statute. If you think they don't have their troubles working out among themselves a satisfactory statute, let me tell you my own experience when the 1954 act was drafted.

I was asked to appear on behalf of the President's bill. I appeared in executive session with the Joint Committee, and I discussed with them the whole field of patents in an attempt to give them some elementary understanding of what you could really do with patents and what they meant in this field and why the provisions of the President's bill, as worked out by the Commission, were desirable.

I was damned by Cole because I was too far one-sided, and I was damned by Holifield because I was too far on the other. Fortunately, the remarks have never been published. The statute came out of that, and I want to tell you again that none of us here at this table wrote that statute.

However, when you get beyond Congress, when they create the provision, and 153 and 155 simply thrown in, then you get into two administrative areas over in the Patent Office, and then I don't know how happy you are with how the Patent Office is handling patent applications over in this field jurisdiction—and then you have the Patent Office over here in AEC.

AEC can control that one area administratively. It can make recommendations to Congress on the statutory side. It can probably have some persuasive effect on the Commissioner of Patents on how he handles the problems, but please bear in mind there are all of these difficulties and we are going to just sit by and try to referee.

Mr. DIAMOND. Thank you very much, Mr. Ooms.

The next speaker on the agenda is Mr. Harold Silver, general patent attorney for Allis-Chalmers Manufacturing Co., whose subject is recognition of private patent rights by the Government and waivers under section 152.

Mr. SILVER. My name is Harold S. Silver. I am general attorney for Allis-Chalmers Manufacturing Co. which is active in nuclear power research and development. However, I am here not representing Allis-Chalmers, but as a private citizen and attorney of 25 years' experience.

My comments will be confined to certain undesirable effects of the Commission's present patent program on manufacturers who undertake AEC research and development projects.

The average manufacturer, when he becomes an AEC contractor, continues business as usual. To meet private competition, he continues to spend money each year developing new products and improving the old. Normally, his engineers and sales force propose more development programs than he can possibly afford. A choice has to be made as to which programs to underwrite and which not to. Prudent judgment tells him to adopt projects which will be most profitable for the company either on a short-term or long-term basis.

Once adopted, a project does not automatically continue to completion. It is periodically evaluated to determine whether it shows enough promise to warrant further expenditures. At these times possible patent protection becomes an important consideration. If patents can be obtained, both here and abroad, the chances are good that the manufacturer will be marketing an exclusive product for a

period sufficient to pay for the development costs and make a profit. On the other hand, the absence of patent protection may decide him to abandon the project or releagte it to a minor role.

This briefly describes the course of development programs in a manufacturing plant in a normal year. A manufacturer is constantly embarking on new projects and dropping unprofitable ones. He is continually putting his best idea men to work on those projects which appear most promising and offer the best return on the investment.

Now, let that manufacturer become an AEC contractor on a research and development project. He wants to do a superior job so he assigns a number of his best idea men to the Government work. These men are selected because they have the experience and capabilities to solve the problems presented. In the course of their work and because of their background and familiarity with the manufacturer's products, they make inventions applicable to the manufacturer's goods. Under the usual type of private commercial contract for research and development, the title to these inventions would remain in the manufacturer. But at this point the Commission's patent policy, as usually written into the contract, operates to deprive the manufacturer of the exclusive rights in these inventions in the very area in which the Commission has encouraged the manufacturer to enter, namely, the nuclear power field.

Vesting the title in the Government to the inventions made in the course of a research and development contract is not without logic when applied to contracts made with educational or commercial research laboratories who make and sell no manufactured product. But when a manufacturer who makes his bread and butter making and selling commercial products does governmental research and development in his own commercial backyard, such vesting is inequitable. It ignores the realities of commercial life because it conveniently overlooks the fact that the Government is never willing to pay for what the title to these inventions is worth.

The engineering, research, and manufacturing knowledge that an experienced manufacturer places at the disposal of the Commission under a research and development contract far exceeds the price paid by the Government. And it transcends the period of the contract because it includes experience prior to the contract paid for with private funds. The thinking of a manufacturer's idea men is not limited by space or time, but cuts across contracts and artificial organizational boundaries. When the Commission exerts its superior bargaining position to strip the manufacturer of exclusive patent rights in the very field he has contracted to investigate, it does him a grave injustice, and in the long run discourages private investment in the nuclear power industry.

If a manufacturer puts his best idea men to work in other fields developing commercially salable products knowing that he retains the patent rights in their inventions, what incentive is there to him to enter the nuclear power field where his competitors are free to copy his designs at no expense to themselves?

It is folly to exempt the nuclear power business from the operation of our constitutionally derived patent system. The Commission, I realize, must operate within the framework of the act of 1954, but even within that framework it is authorized great discretion. The public has nothing to lose and everything to gain from a Commission patent

program which encourages business to spend its own money to develop and market new products embodying inventions made by contractors while fulfilling AEC contracts.

I therefore urge the Commission to waive claim to title to inventions, other than weapons covered by section 151, useful in the production or utilization of special nuclear material or atomic energy made or conceived under any contract, as the Commission is authorized to do under section 152 of the Act of 1954. Such waiver will not prejudice the Commission's right to a paid-up, nonexclusive license to practice such inventions for governmental purposes.

I also urge the Commission, in accepting such paid-up nonexclusive licenses, to do so with the understanding that use for governmental purposes specifically excludes furnishing services and supplies to the general public in commercial competition with the contractor or its licensees.

Such a patent program, if adopted by the Commission, will make full use of our patent system to furnish incentive for industrial development and growth which are so essential to full employment and the Nation's welfare.

Mr. DIAMOND. Thank you, Mr. Silver.

As I understand your suggestion, Mr. Silver, it is that the Commission waive in blanket form its rights to any inventions that would be made because of the contract, and this would be done pursuant to section 152. It would be a general waiver under section 152. Its effect would be negating section 152?

Mr. SILVER. I believe that would be desirable. That was not my particular point that I made. I did not go that far.

I believe that it is desirable that the Commission waive such rights as it might obtain under contracts with contractors for research and development as would permit the Commission to put the contractor's competitors into commercial competition with the contractor, merely accepting rights for governmental purposes and not permitting a contractor's competitors to obtain rights which would put them into commercial competition with a contractor in his own commercial back yard.

Mr. DIAMOND. I would like to seek clarification on whether or not this would be a specific waiver in each contract or would it be a general waiver to apply to all contracts?

Mr. SILVER. I think it could well be a policy that would apply to all contracts.

Mr. DIAMOND. The next speaker is Mr. Anthony Cennamo, patent counsel of the Industrial Nucleonics Corp. His subject is "The Effect of AEC Patent Program on Utilization of Byproducts."

Mr. CENNAMO. Pursuant to the notice of review of the atomic energy patent program by the U.S. Atomic Energy Commission, the following comments on "The Effects of the Atomic Energy Commission's Patent Program on the Commercial Utilization of Byproduct Material" are submitted on behalf of the Industrial Nucleonics Corp.

I. BACKGROUND

The successful advancement and control of atomic energy and its uses under the Atomic Energy Act of 1954 may be considered generally as composed of three aspects: (*a*) military utilization; (*b*) power; and (*c*) other commercial utilization of radiosotopes.

In the category of military utilization the Commission, by understandable necessity, has retained a complete monopoly and full control over all phases, including the developments of others.

In the power field the Commission has maintained an active and vigorous program to encourage the development and construction by private organizations of atomic reactors for power purposes primarily through the underwriting of a very large proportion of the cost.

In the class of industrial, medical, and research uses of radioactive materials, the Commission has promoted progress by the licensing of users and through the widespread dissemination of restricted data to American industry. However, except for certain Department of Defense research, such as the Army Quartermaster Corps' food preservation program, developments in this category have been by private enterprise with, comparatively speaking, virtually no financial backing from the Government.

II. HISTORY OF INDUSTRIAL CONTROLS

The widespread use of radioisotopes during the last 10 years has been the first extensive civilian and industrial application of atomic energy ("Atomic Energy Facts"—U.S. Atomic Energy Commission, ch. IX, "Radioisotopes").

A number of private companies have an established industrial and patent position in the commercial utilization of atomic energy. These companies commenced operations by developing industrial controls from technology available to the public. Industrial Nucleonics Corp., of Columbus, Ohio, is a typical industry. These companies have demonstrated to the public their use of the atom through the application of their equipment to the industrial processes and have promoted their technology with its potential economic benefits to the users. The savings to industry from the use of radioisotopes has been estimated at $300 million to $500 million during 1957.

III. FUTURE ATOMIC ENERGY PROGRAM

Since many companies have dedicated themselves to promoting the widest possible uses and benefits to the industrial and research uses of radioisotopes, it is not difficult for them to visualize that the Commission's role in the very near future will be more greatly emphasized in this aspect of the program.

From a public interest and good-will standpoint, for both the Atomic Energy Commission and private industry, the exploitation of the atom in a manner that most closely and directly affects the public would seem to be a matter of necessity. The means for effectively gaining public acceptance of atomic energy can be most expediently and unexpensively carried out by those with the present know-how and ability.

IV. REVIEW OF PATENT SECTIONS OF ATOMIC ENERGY ACT OF 1954

It is respectfully submitted that the following sections be rewritten while taking into consideration the accompanying comments.

A. Section 152: This section of the act gives the Commission title to any invention or discovery useful in the production or utilization of atomic energy if they are—

made or conceived under any contract, subcontract, arrangement or other relationship with the Commission, regardless of whether the contract or arrangement involved the expenditure of funds by the Commission.

In retrospect, it now appears that perhaps in the military program and in those nonmilitary instances where available private capital is insufficient to the developments for the public interest, the Commission may be justified in retaining a stringent patent program. However, the granting of a complete patent monopoly to the Commission on inventions relating to the commercial application of atomic energy by contractors that have an established industrial and patent position, and which positions were acquired without either governmentally created incentive or financial assistance, is not believed to be warranted.

The Commission has recognized the industrial and patent position of the contractor in the field of work of the contract in setting forth its policies and practices relative to contract patent clauses. Nonetheless, even type C clause, the most liberal, does not permit the retention by the contractor of commercial patent rights to inventions relating to the use or utilization of atomic energy. This clause does not distinguish between industries that acquired their position by prior contract and those industries that acquired their position on their own behalf.

This section of the act, as well as future policies and practices of the Commission, should permit the contractor that had an established industrial and patent position prior to entering into the contract to retain the commercial rights to all inventions made from routine development or production work. A strong line of distinction between complete assistance and mere furtherance of the atomic energy program should be drawn.

The filing of affidavits required by section 152 is believed to be an unreasonable burden placed on the patentee. As pointed out above, the development of commercial products utilizing radioisotopes has been by private capital and not through Commission funds. Most companies in this field have had no contracts with the Commission or perhaps only incidental subcontracts for minor sums. Nonetheless, every patent application relating to the use of atomic energy must be accompanied by an affidavit setting forth all facts surrounding the making of the invention, the primary purpose, of course, to determine what, if any, public interest there is in the invention.

As patent attorneys, we are all familiar with the amount of labor involved in filing rule 131 affidavits and the costly and time-consuming burden of obtaining information for purposes of interference. This section of the act has compounded this burden. The necessity of requiring such a detailed history of every invention relating to atomic energy, therefore, by those companies having no contractual relationship with the Commission is neither appreciated nor understood.

In summary of section 152, it is submitted that the developers of commercial uses of radioisotopes should be permitted to become AEC contractors without having to grant to the public that which had found its basis through private funds. In other words, the granting to the Commission of any more than what is required of contractors of other Government agencies is not warranted.

On the other hand, if the developers of commercial uses of radioisotopes has not and will not become AEC contractors, then these

companies should be relieved of the burdens, such as the filing of affidavits, normally required of contractors.

B. Section 153: This section of the act provides for the compulsory licensing of patents in the field of atomic energy. Even though past history tells us that the prerogative of the Atomic Energy Commission to grant a compulsory license has not been exercised, this section, nonetheless, is of extreme concern to those industries competing with commercial products utilizing radioactive material.

Basically, the commercial utilization of atomic energy has three phases: (*a*) development; (*b*) manufacturing; and (*c*) marketing.

The pioneering or basic developments are no longer available for patenting even though atomic energy may yet be in its infancy. Consequently, any developments that may be made in this field will be limited to a particular commercial application. If the monopoly relative to this particular commercial application is broken, the returns from the developments may be lost.

In the manufacturing of commercial devices incorporating radioactive material, it is the know-how of one corporation over its competitors that determines which company's products will be sold. Patents provide a reasonable amount of patent protection for that know-how. Again compulsory licensing leaves the more ingenious manufacturers without their competitive advantage.

In the field of marketing, it can be shown that the greatest return lies in the first years of the sale of a new product. After the product has been marketed for a time, competition not only lowers the sale potential, but the company's reward for providing the public with new and better products is diminished relative to that particular item. This, of course, will occur in every instance where a patent can offer no protection against competitors after the initial years of sale.

Lastly, of extreme concern to industries in the commercial utilization of radioactive material is their patent licensing programs. Under the present program a patentee's control of his licensing rights are constantly in jeopardy. Since there is the probability that a license to a competitor may be required, the granting of an exclusive license and the complete control by the patent holder of the disposition of its patents is not possible under this action.

V. CONCLUSIONS

The Atomic Energy Commission is making a concerted effort to bring the immediate benefits of atomic energy to the public, and it is acknowledged that the first and most extensive civilian and industrial application of atomic energy has been in the widespread use of radioisotopes. And the commercial development of the use of byproduct material has been without Commission funds.

In spite of the acceptance of the industrial uses of radioisotopes, the sections relating to patents in the Atomic Energy Act of 1954 are directed to military applications and to AEC contractors.

The companies in the marketing of products utilizing atomic energy are endeavoring to improve the benefits to the public; similarly, the Commission is endeavoring to improve the benefits to the public, but yet, these companies and the Commission have assumed contradictory positions. The companies are refraining in every manner, because of competition, from making useful information public,

whereas the Commission is making efforts to disseminate information to the public. The reason for this difference in position is that the present patent laws do not provide that measure of protection normally incident to a patent.

It is urged, therefore, that the Atomic Energy Commission submit patent legislation to Congress rectifying the inequities to the commercial developers of the use of byproduct material.

Mr. DIAMOND. Are there any questions that anyone would like to address to Mr. Cennamo?

Mr. OOMS. I understood you to say that there were situations where industry had put in all of the money and the AEC nevertheless procured the patent rights. Did I misunderstand you?

Mr. CENNAMO. No, sir.

Let me use a specific example.

The Industrial Nucleonics Corp. started with private funds, with certain individuals with certain know-how. They have developed certain products which have wide industrial application. The Industrial Nucleonics Corp. possesses a great deal of know-how and ability. This company would very much like to further the Atomic Energy Commission's program. In other words, they would like to become contractors.

I am not speaking of the present situation. I am speaking of the years to come, and I am stating that under the present patent laws, where we are dealing with a hot commercial item where the competition is keen, we cannot develop products for our competitors under AEC contracts.

Mr. ANDERSON. If you had a product, wouldn't you be selling it?

Mr. CENNAMO. It would be in the development of new products that would be of commercial interest.

Mr. ANDERSON. In other words, if we made a contract upon something you are selling, assuming we fostered the whole research bill, then your position would be that we should acquire nothing more than a nonexclusive license?

Mr. CENNAMO. That is correct.

Mr. DIAMOND. The next paper will be presented by Mr. Richard Whiting, of the American Patent Law Association.

Mr. WHITING. My name is Richard Whiting and I am here as spokesman for the American Patent Law Association. My address is 1625 I Street NW., Washington, D.C.

This association is composed of some 2,000 or more members engaged in the practice of patent law located throughout the country. It is not a local organization only.

The American Patent Law Association is already on record with the Commission as to its general point of view in commenting on proposed bill H.R. 600. On December 11, the association wrote a letter to Hon. Carl T. Durham and I am quite sure a copy came here, stating as follows:

> We are of the opinion that all reference to patents should be deleted from the Atomic Energy Act of 1954 except those which relate to weapons or to secrecy or compensation in the weapon field.
>
> In the nonweapon field we believe there should be a uniform patent law applicable to all inventions and that the availability of the benefits of atomic energy to the public will be advanced by the enactment of legislation to so provide.

We see no justification for having one patent law for atomic energy and another for inventions generally.

That is the end of the quote from the letter of December 11.

In preparation for the hearing this morning, the matter was referred to the Atomic Energy Subcommittee on the committee on legislation of the American Patent Law Association. That statement was prepared and circulated to the legislative committee as a whole and after some revision then went before the board of managers of the American Law Association.

This I would like to say, is rather hasty preparation for this meeting this morning, but what I propose to do now is to just give you the high spots of this report of the subcommittee which has the approval of the board of managers. It says:

A rational approach to atomic energy inventions in this country calls, ideally, for elimination of chapter 13 of the Atomic Energy Act of 1954, or at least drastic revision of that chapter so as to remove the harmful restrictions which it places on that field of technology.

But there is also much that might be done within the framework of the present act to improve the circumstances under which private industry operates with respect to inventions in that field.

Whatever may have been the justification in 1946 for treating atomic energy inventions as something requiring special treatment, that has long passed. Many of the imagined hazards of atomic energy have been dissipated.

Atomic knowledge abroad has largely kept pace with our own and possibly outstripped in some areas. The present atomic energy patent policies no longer is a rational approach, for it stifles private capital's initiative and participation in a mushrooming field of development which is and will continue to be of vital importance to mankind and to the prosperity of those nations which best exploit it.

Hence, atomic energy inventions should now be treated like any other inventions in this country, both patentwise and propertywise.

So, the first point the committee is making is that chapter 13 in toto should be repealed. Its second suggestion is that, short of that, at the very least, chapter 13 should be drastically modified so as to relax the unique Government control which now bestrides that field.

The minimum program which this committee, and this report that has the approval of the Board of Managers, proposes for amending the present act in the event that you do not see fit to completely delete chapter 13 is the following:

On section 151—confer patentability upon atomic weapons inventions, subject, of course, to the operation of the existing secrecy statutes. Clarify the provisions as to reporting atomic energy inventions to AEC.

Now, let me pause there, if I may, to say in the committee work on this matter that their conclusions on that point were not entirely uniform. There were some dissenters from that point of view who felt that atomic energy invention weapons should have special treatment but the majority view and that held by the Board of Managers is that patentability should be conferred on weapons as well as anything else.

On section 152—and this is short of appeal of the chapter, the suggestion is:

Handle domestic and foreign rights to inventions made in the course of private contractor work in the same manner as done by the Defense Department. That is, the Government should have only a nonexclusive royalty-free license for governmental purposes with the contractor retaining title to the invention and to the commercial rights therein. Such a license is all that is needed in order that the public may have full value from the tax money spent in the developing of the invention.

Furthermore, inventions made as a result of such relationships with AEC as the mere renting of AEC facilities or equipment should belong entirely to the private developers.

A former Commissioner of the Patents has called section 152 the most mischievous provision in the act and its own draftsman has confessed that too much was written into it.

With respect to section 153 the proposal is as follows:

Eliminate the compulsory licensing system created by this section, a feature hitherto unknown in U.S. patent law except as a penalty in the antitrust field, and foreign to our prior patent philosophy. If, initially justified by fear of broad monopolies in the hands of a few atomic energy pioneers, the extent to which atomic energy development has now spread throughout industry erases that fear.

At least the present application deadline of September 1, 1959, for including patents under this section should not be advanced.

Now, with respect to section 155:

Delete the provisions which permit secret prior knowledge or use to bar the patenting of an invention. This is a drastic deviation from the general patent statutes, which are grounded upon public disclosure of inventions, whether in patent (both prior patents and those sought for new inventions) or in publications, or by sale of things embodying inventions.

At a minimum, only such once secret knowledge or use as has been presented in classified material available to AEC contractors generally, should constitute such a bar to patenting.

That concludes the second suggestion. The first is that chapter 13 be repealed and the second is that if it is not repealed that it be modified in these respects, and the third suggestion by the association is that there should be a change from the AEC practice under the act as an interim measure leading to changes in the act or repeal of the chapter.

Pending repeal or modification of chapter 13, there are several steps which AEC should take promptly under the present act. Section 151(c): The Atomic Energy Commission should make public its interpretation of the language in section 151(c) as to the fields in which invention reports are required and as to when such reports are required.

Section 152: The AEC should make available to the public a full statement of its policy rules for determining whether or not it shall waive its claims to contractors' inventions. This should include a statement of what types of AEC contracts, arrangements, and relationships, and what facts surrounding the making of inventions, preclude or favor AEC waiver.

It should also clearly state what is required of applicants in their affidavits as to the invention-surrounding facts. Swifter AEC decisions as to waivers of claims should be made, so that applicants may have better opportunity to make the decisions which face them when there is waiver; for example, decisions as to filing foreign applications.

The next category is the AEC contracting policy as to taking title.

Without awaiting the revision of section 152 suggested above, AEC should revise its contracting policy so as to leave in its contractors the title to their inventions, reserving to the Government only a nonexclusive license for governmental purposes.

Next, with respect to the filing of patent applications:

Until such an overall policy change is effected as is suggested in item 7 above, AEC should make early determinations as to whether it will file patent applications on contractors' inventions.

Where it decides not to file domestic or foreign applications, the contractor should retain title to the invention and the right to file such applications as it wishes, giving the Government only a nonexclusive license for governmental purposes.

That concludes the report of the American Patent Law Association.

STATEMENT OF PAUL NELSON, STAFF ECONOMIST OF THE NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION, WASHINGTON, D.C.

Due to a last-minute problem, it will be impossible for me to personally attend the AEC patent meeting scheduled for April 15, 1958. I would, however, greatly appreciate your acceptance of the document, which presents our views on the AEC domestic patent policy, for consideration and insertion for the record.

The National Rural Electric Cooperative Association has long manifested a deep interest in our atomic energy domestic patent policies. This association has a direct economic interest in AEC's patent policies because of their most probable affect on the rate of development of atomic power technology and cost of atomic power.

This association has gone on record supporting the belief that any atomic power technology developed through the use of public funds should remain in the public domain, with no special pecuniary advantage accruing to any private interests or firm.

In like manner, the National Rural Electric Cooperative Association believes that atomic energy technology developed through the use of private funds and financing, the owner of such patents is, according to tradition and law, entitled to just and reasonable monetary compensation. However, we have consistently held, and continue to do so, that proper steps should be taken and maintained to preclude the development of monopolistic practices in the nuclear power field through the restrictive and exclusive use of patent rights.

By definition, the granting of a patent carries with it the granting of a monopoly privilege, and it is our belief at this time, that such practices, if allowed to exist, could seriously stifle the full and most efficient development of our nuclear power industry.

One of the sections of the Atomic Energy Act of 1954 which has gone a long way in preventing the monopolization oi atomic energy technology in section 153. Former Attorney General Herbert Brownell referred to this section of the Atomic Energy Act as the section which enables "preventative action" to be taken in an effort to maintain competition in this vital and nascent technological field.

"Preventive action" to maintain competition in this new technological field is maintained, according to Mr. Brownell, because the Atomic Energy Commission is authorized to require the cross-licensing of privately owned patents when they affect the public interest.

However, the entire potency of this antimonopoly provision will be dissipated because the law calls for the cessation of this provision after September 1, 1959. After this date, the public, through the Attorney General's Office will be in a position to take only remedial action against the development of monopolization of the atomic energy technology, and history is replete with failures and long costly delays via this approach.

NRECA, beginning with the debates on the proposed 1954 atomic energy legislation, has continued to oppose the granting of normal patent rights where atomic energy technology has been concerned and felt at that time, and continue to do so, that a 5-year period of compulsory cross-licensing was centrainly too short a period of time when one views and analyzes the status and progress of development of the atomic arts to date.

Our contentions seem to have been borne out when one views the rather boastful statement made in 1954, and prior and since, that full scale "discovery and development" of atomic energy technology is "just around the corner." Such prophecies and prognostications have, to say the least, been overoptimistic.

Currently, the consensus appears to be that nuclear plants capable of producing energy at costs comparable to conventional plants, even in high-cost fuel areas in the United States will not be developed until the mid-1960's. And some hold that even these plants will not be the most forward in design, and that significant and sizable improvements in design and fabrication will take place following the mid-1960's.

Another fact causes us to look at the end of the compulsory cross-licensing period with great misgiving and foreboding. It is obvious that many areas of atomic energy technology remain to be explored. We have just scratched the technological surface in the fission power field, and have hardly "gotten our feet wet" in the field of controlled thermonuclear reactions.

Since, in general, we are still groping in the dark in the field of atomic energy technology, it appears to us that a program of compulsory cross-licensing must be maintained if we are to preclude the monopolization of atomic energy technology.

This point has been well expressed by one of the most qualified experts in the field of atomic energy patent law and policy. Mr. Casper Ooms, former U.S. Commissioner of Patents, and the Chairman of the AEC Patent Compensation Board since its inception in 1949 stated the problem and solution this way:

> The possibility of the issuance of a single patent on an invention of the scope of those made by people like Fermi, Seaborg, or Dunning compels one to face the fact that the possibility exists that in this young industry a dominating patent may appear which may forbid all competing activity in the area. One can say with some assurance that almost any American industry that would procure such a patent, or any American citizen that might procure such a patent, would freely license it to the industry at large.
>
> One can say that with assurance, but no positive assurance. It is against the contingency of the appearance of a single dominating patent in the hands of an unyielding owner who might refuse to license it and thus handicap the entire field of atomic energy activity, that the compulsory licensing provisions of atomic energy legislation are designed.
>
> However remote the contingency, the fact that it exists justifies the creation of this reserve power of compulsory licensing to insure that no unnecessary obstacle be raised against the bright promise of this great industry.
>
> Other proponents of compulsory licensing have argued that compulsory licensing is necessary in order to prevent the creation of a monopoly. The Atomic Act of 1954, reflecting these fears, contains special provisions to prevent the creation of a monopoly. Any monopoly that might be created as a patent monopoly would be legal, and no thrust of antitrust legislation or even the special provisions of the Atomic Energy Act would reach it.
>
> Any monopoly created under a patent is obviously a legal monopoly and not within the reach of the antitrust laws, if the patent holder does no more than exercise the rights created by the patent. No patent of itself creates an illegal monopoly.
>
> It is only transactions and contracts or the combination of patents which create illegal monopolies. The possibility of any single patent arising which may create a monopoly in atomic energy because of the peculiarly dominating character of the patent may be quite remote but nevertheless sufficiently real that as long as apprehension continues that this possibility may be realized, some provision should be made for it.
>
> A properly guarded and restricted provision to permit the Commission to exercise a reserve power of subjecting any dominating patent to compulsory licensing seems at this stage to be a necessary part of atomic energy legislation. The very

restricted provision for compulsory licensing which is found in the 1954 act accomplishes this purpose.

And finally, two of the Nation's leading economists, Walter Adams and Horace M. Gray, stated the problem and solution in this manner:

> It should be apparent, then, that the argument that ordinary patent privileges should apply to atomic energy in the same way that they apply to other fields is not justified by the facts, at least this time. To say that everybody has an equal opportunity to patent inventions and discoveries is misleading and disingenuous.
>
> It is not equal opportunity to open the door to any and all comers, when some are on the doorstep and others are miles away. It is not enough to define free enterprise like the elephant, who, dancing among the chickens, shouted, "It's every man for himself."
>
> Whether compulsory licensing of patents should be the rule for another 5, 10, or 15 years is almost impossible to say at this moment, but the better part of wisdom would be to continue compulsory licensing long enough to assure broad participation in the industry and development along competitive, rather than monopolistic lines.
>
> Let the race go to the swift, but only after all contenders have had a chance to move up to the starting line.

The National Rural Electric Cooperative Association has recommended in the past and continues to do so at this time that the expiration date for section 153 of the Atomic Energy Act of 1954 be extended for a significant time in the future, with periodic review to determine whether or not any relaxation or strengthening of the compulsory cross-licensing is in order. It is our strong hope and desire that the AEC will include in any of its recommendations to Congress an agreement to these facts and sentiments.

Mr. MACKEY. We appreciate this opportunity to comment on the Commission's patent program and consult with the Commission on this important area of the atomic energy program. It is our hope that there will continue to be opportunities for those interested in atomic energy matters to consult with the Commission in the many areas of common interest.

Our statement today is limited to matters considered to be of particular significance to those participating in the field of atomic energy and amplifies the General Electric Co. comments submitted December 17, 1957, in response to the November 19, 1957, notice advising of the Commission's review of its patent program.

It may be that a basic problem in approaching any discussion of patents is that there is confusion as to whether patent rights should be treated differently than other property.

We do not believe so. Patents represent valuable property and should be recognized and treated like other forms of valuable property.

The U.S. patent system provides a climate that warrants the venture of funds to finance the introduction into public use of new concepts and provides incentive to invest in the search for new technology. The patent system operating without the restraints that exist in the atomic energy technology. Therefore, it is our view that some of the provisions of the Atomic Energy Act of 1954 relating to patent matters should be amended.

However, it has been assumed that this meeting primarily is concerned with and is intended to be limited to the administration of atomic energy patent matters within the framework of existing law.

It seems significant that participation in the atomic energy field has increased from a few Commission contractors in 1946 to many Commission contractors and over 1,400 holders of civilian access permits today. Also, there has been significant contribution and participation by industry in the form of private financing, facilities, and skilled personnel, particularly since the passage of the 1954 act. The whole complexion of the atomic field has changed since the late 1940's; however, in many areas, the published Commission contract practices with respect to patents are relatively unchanged.

Therefore, we are encouraged by the interest in proprietary information and patents which is evidenced by this meeting.

Areas which seem particularly deserving of special consideration and on which I plan to comment briefly are: Commission contract procedures and practices, and section 152 of the Atomic Energy Act.

COMMISSION CONTRACT PROCEDURES AND PRACTICES

A purpose of the Atomic Energy Act of 1954 is to provide for a program of conducting, assisting, and fostering research and development in order to encourage maximum scientific and industrial progress.

In view of the very substantial research and development conducted under Government contracts, it seems particularly important that Government contract practices relating to new technology in the atomic field accomplish this purpose to the maximum extent possible.

We have some question whether present Commission contract practices further the public interest and suggest that the Commission may wish to review its contracting practices from the point of view of whether these practices encourage maximum scientific and industrial progress.

For example, it is submitted that it may not be in the public interest for the Government to bargain as a proprietary entity to acquire as much nuclear technology as possible for the Government.

Some areas which we believe should be reviewed include the following.

A. Patent rights—General

The essential provisions of the Commission contract clauses relating to patents and proprietary information were developed during a period when private industry was not actively engaged in developing peaceful uses of atomic energy. Instead, substantially all work in the atomic field was carried out by a few contractors operating under great secrecy.

Accordingly, it was the judgment at that time that the contractor should retain no rights to inventions in the atomic field. We submit that the changes which have occurred in the atomic field in the last decade call for reexamination of Commission practices in this area.

Under published Commission patent clauses, contractors do not retain patent rights in the atomic energy field. While the Commission has followed the practice of allowing a contractor to file a patent application, when the Commission decides not to file a patent application and of granting to the contractor nonexclusive rights in the atomic field, there is little incentive, in view of the free licenses available under Commission-owned patents, to take out U.S. or foreign patents to the extent inventions have application in the atomic field.

Also, the Commission has not, on many occasions, been sufficiently prompt, in advising the contractor whether the Commission will file patent applications and in determining the contractor's rights under any patent the contractor may obtain on the invention, to assure optimum patent coverage and encourage contractor participation in domestic and foreign patent procurement.

Therefore, we suggest that the Commission consider—

1. Taking steps to assure early determination as to whether the Commission is planning to file patent applications based on Commission-sponsored inventions and, where the Commission is not going to take out patents, make all rights to inventions available to contractors, reserving for the Government nonexclusive rights for governmental purposes. This should encourage contractors to obtain domestic and foreign patents and appears to reserve for the Government all rights necessary for its purposes.

2. Revising its patent clauses to provide that the title to inventions remains with the contractor and for the grant by the contractor to the Government of nonexclusive licenses to practice such inventions for governmental purposes. The patent clauses would then be similar to those used in Deptrtment of Defense contracts not involving atomic energy. This would tend to increase the attractiveness of Commission contracts, and would introduce commercial incentive in the procurement of effective patent protection while protecting Government interests, both domestic and foreign. Also, private investment in promising concepts resulting from Government contracts would be encouraged and more rapid development of nuclear technology should result.

B. Patent rights—Foreign

Adequate foreign-patent coverage has been considered essential for U.S. industry to compete effectively in foreign countries particularly in view of the higher manufacturing, transportation, and other costs which must be borne by U.S. industry attempting to market its products in foreign countries. Privately owned patents in other fields have helped assure freedom to market products in foreign countries and have been useful in obtaining satisfactory licenses under foreign-owned patents.

An inquiry into the adequacy of foreign-patent coverage on atomic inventions seems particularly significant in view of the potential foreign market for atomic products and the importance of U.S. participation in this market. Also, recent investigations of foreign patents in the atomic field seem to indicate a need for increased activity to protect U.S. interests.

Since a substantial amount of research and development in the atomic field is sponsored by the Government, adequate foreign patent protection of the results of this research and development is expected to be a contributing factor to the ability of the U.S. atomic industry to effectively market its products in foreign markets.

However, as has been pointed out, present contract practices discourage filing of foreign patent applications by contractors, since there is no opportunity to recover the cost of such filing to the extent that the invention is valuable in the atomic field. Thus, the Commission has filed most of the foreign patent applications based on nuclear technology resulting from Government contracts.

It would seem worthwhile to consider whether the very limited number of Government-owned foreign patents that are and can be expected under present contract practices further the national interests to the extent that these interests would be furthered by encouraging Government contractors to file foreign patent applications for atomic energy inventions.

It is believed that the most effective foreign patent coverage can be realized by encouraging contractors to file foreign patent applications. This might be accomplished by providing that the contractor retains title to the invention and any patents based on the invention and grants nonexclusive rights to the Government for governmental purposes. These rights should help justify the speculative costs of obtaining and maintaining foreign patents and should at least assure the possibility of recovering these costs through licensing.

Short of this preceding suggestion and to the extent contractors do not file foreign patent applications, it is suggested that:

1. The Commission consider early publication of technical developments as a device for minimizing the possibility that U.S. nationals will not be free to operate in foreign markets because of adversely held patents.

2. Pending the results of the suggested consideration of publication of technical developments and to the extent that publication would not be effective in some countries:

(*a*) The Commission program of taking out foreign patents on Commission-sponsored developments should be stepped up and,

(*b*) Where the Commission elects not to file foreign patent applications, the contractor should be permitted to obtain foreign patents and be granted all rights under any such patents, reserving for the Government nonexclusive rights for governmental purposes. This would help justify the speculative costs of obtaining and maintaining such patents.

C. Other contracts practices

1. *Background rights.*—There have been instances where the Commission has requested and obtained extremely broad background rights to patents and technical know-how which shall or can be utilized in the performance of the contract, regardless of whether such patents and know-how were developed under the contract.

Background technology is an essential part of a contractor's competitive position and erosion of this position by Government acquisition of background rights which can then be made available to a contractor's competitors does not appear to be in the public interest.

In those rare instances where the Government has a real need for background rights, for example, to establish alternate sources of supply for purposes of assuring the national security, it would seem that careful consideration should be given to establishing a policy of negotiating for and compensating the contractor for the use of such background technology as a separate item.

Also, many Commission contract clauses relating to technical data fail to provide for recognition of technical data owned by the contractor.

Therefore, a review of Commission policies and practices relating to technical data seems to be indicated.

2. *Recognition of patent rights.*—There is statutory provision for a patentee to recover from the Government for the use of his invention

in the performance of a Government contract. However, many patentees cannot file a claim even though the patented invention is used, since the security restrictions surrounding Commission financed work often preclude the patentee from knowing that his patented invention has been or is being used. The Commission is not known to make a practice of determining whether the patent rights of others may be violated by a contractor's design.

Therefore, the rights of many patentees may be violated by the contractor in the performance of Commission contracts. The contractor may not be legally responsible. But isn't there a further question of responsibility? Should not the Commission encourage the recognition of patent rights of others?

Two sections of the Atomic Energy Act of 1954 have proven particularly troublesome to those participating in the atomic field.

These are:

Section 151: Section 151(c) of the Atomic Energy Act of 1954 requires any person who makes any invention or discovery useful in the production or utilization of special nuclear material or atomic energy to report the invention to the Commission within 90 days after completion of the invention or 90 days after the person first discovers or first has reason to believe that the invention or discovery is useful in the production or utilization of atomic energy.

It is not clear from the act what is meant by "useful in the production of * * * atomic energy" and "completion of such invention." The result of failure to comply with this section is not clear. Also, it is not clear what use the Commission intends to or may make of reports submitted under this section.

Therefore, the uncertainty as to the interpretation of section 151(c) and the Commission practices under this section make it difficult for one to know when he has complied with the section.

This uncertainty might be minimized by the publication of a Commission interpretation of section 151(c) and a statement of the procedures followed by the Commission in handling reports submitted under section 151(c).

Section 152: Section 152 of the Atomic Energy Act of 1954 provides that any invention or discovery useful in the production or utilization of atomic energy, made under any contract, arrangement or other relationship with the Commission, regardless of whether Government funds were expended, shall be deemed to have been made by the Commission, except that the Commission may waive its claim, and also provides for an affidavit, by the applicant for a patent, setting forth the facts surrounding the making of the invention. If the affidavit is insufficient, the Commission may direct the Commissioner of Patents to issue the patent to the Commission.

The Commission seldom waives any claim under section 152 until the patent covering an invention is ready to issue. In order to obtain the benefits of the international convention, an inventor usually must file patent applications in foreign countries before the Commission acts under section 152. Thus, the inventor may, at considerable expense, obtain a foreign patent and then find his rights to the invention challenged. Foreign patents are always a speculation. The present administration of section 152 increases the risk.

The Commission has not stated precisely what statement of facts will be sufficient to assure rights to inventions covered by section 152.

Certainly to the extent that investments are made in anticipation of developing proprietary atomic energy technology protected by domestic and foreign patents, this section and the Commission's present administration of this section tend to discourage such investment.

In connection with the administration of section 152, the Commission might:

1. Consider what relationship will form a basis for asserting rights under section 152 and as a result of such consideration issue additional blanket waivers in areas affected by section 152. For example, the Commission might make it clear that where inventions are made under a Government contract, the contract provisions are the sole basis for determining rights to the invention.

2. Make early decisions as to waiving any claim under section 152. The risk of the Commission not knowing the precise scope of the invention involved, because claims in the patent applications have not been allowed, would seem to be outweighed by the encouragement of investment, both domestic and foreign, in the atomic field that would result from prompt Commission action.

3. In connection with 2 above, state precisely what is required to be included in affidavits so that inventors can accumulate and retain all information necessary for such affidavits. As a possible approach, the Commission might, when notified of patent applications by the Commissioner of Patents under section 151(d), waive its claim under section 152 or request an affidavit. The inventor could then submit an affidavit and request a prompt decision by the Commission.

We have commented on several aspects of the Commission's contract practices and the Commission's administration of patent sections of the Atomic Energy Act of 1954 which are believed to have a significant impact on scientific and industrial progress in the field of atomic energy. It is our sincere hope that these comments will be helpful to the Commission in the review of its patent program.

Mr. DIAMOND. Mr. Mackey, I have a few questions I would like to ask you.

First, about how many contracts does General Electric have with the Commission where General Electric is fully reimbursed for performing the work?

Mr. MACKEY. We have it in terms of cost contracts, and that is on the order of four or five.

Mr. DIAMOND. What would that run into in costs in dollars?

Mr. MACKEY. I would hesitate to make a figure since I do not have those figures in mind.

Mr. DIAMOND. Do you have any idea how many inventions have been made under these contracts and how many patents have been applied for?

Mr. MACKEY. I have a fair feeling about it, but Mr. Anderson could probably make a better statement on that.

I hesitate to try to quote figures on this when I don't have them right at hand.

Mr. DIAMOND. Is it over 100, or 200 applications that have been field

Mr. MACKEY. I am getting into an area where Mr. Anderson disagrees with me. I would hesitate to comment on that.

Mr. DIAMOND. It would certainly be over 100?

Mr. MACKEY. Yes.

Mr. DIAMOND. You would propose in all of these cases the Government would end up with all the rights for governmental purposes only and none of the competitors of General Electric would have any rights?

Mr. MACKEY. Not at the General Electric's expense.

Mr. MOORE. My name is W. T. Moore and I am manager of the Atomic Energy Division of the Babcock & Wilcox Co. My company has manufactured and sold equipment and products to the power industry for more than 75 years. This includes steam generators, pressure vessels, heat exchangers, tubes, and special refractories.

B. & W. has participated in the atomic energy development since the Manhattan project and since 1953 has offered to build and sell nuclear reactors. Presently, we have a contract with Consolidated Edison Co. of New York for a large power reactor and with the Atomic Energy Commission for a reactor for the N.S. *Savannah*, the first nuclear merchant ship. We have built or are building several research reactors. Additionally, we are engaged by the AEC to design, build and operate a liquid metal fuel reactor experiment.

I am appearing here today accompanied by R. T. Bryan, an attorney in our patent department, to present the views of the Babcock & Wilcox Co. on the effect that the AEC patent policy has on a manufacturer of power reactor equipment and to amplify my letter of December 19, 1957, to the Commission on that subject. Mr. Bryan and I will endeavor to answer any questions that may arise either during my presentation of these views or afterwards.

My company is of the opinion that the contracting policy of the AEC largely excludes the benefits of the U.S. patent system from the atomic energy field. Our discussion does not apply to the weapons program as we are in agreement with these provisions of the act, nor with those other relatively narrow areas of the atomic energy field in which national security is involved.

In the power equipment business, other than atomic energy, a customer usually presents the manufacturer with a functional specification and requests quotation of a fixed price for supplying the equipment. The manufacturer designs a piece of equipment to meet these specifications, estimates his price and submits it to the customer.

The bargain is struck when the customer obtains a price from the manufacturer that represents, to him, a fair price for the equipment. I emphasize that in these arrangements he purchases designed equipment and not rights to contractor inventions embodied in the equipment.

The manufacturer is in business to supply such equipment at a profit, but in the first of a kind he may encounter a loss either due to lack of full appreciation of the problems involved or purposely to give his first customer an attractive price. The manufacturer is confident that he can produce a quality product that will be saleable to others. The initial losses are expected to be recovered and profits made, on the sale of future units.

This situation exists largely by the operation of the U.S. patent system whereby one can obtain the right to exclude others for a period of 17 years from copying or otherwise emulating the manufacturer's patented equipment. If the initial customer were to demand the

right to reproduce the equipment and also take the inventions made in designing the equipment, a manufacturer would be left with nothing upon which to found his future business. He would be unable to sell future units at a price sufficient to recover his loss and make a profit, in competition with the copier who had made no investment and who probably could manufacture at similar cost.

This presentation is confined to the power equipment situation and does not apply with the same force to multiple unit production operations where profit is largely a function of the production skill of a concern. The power equipment manufacturer must carry a large engineering staff whose function it is to continually improve the product. Engineering is a major item in the cost of each piece of equipment sold in our industry.

We believe that the free operation of the U.S. patent system would spur manufacturers to attempt different approaches to the various basic types of reactors and thus would bring about the rapid advancement of the technology. This has been traditional in our society and this Nation has obtained its great material wealth operating under such a patent system.

Over the years the U.S. patent system has provided the most effective means whereby a company of limited financial resources can protect the product of its scientific and engineering talents and for the period of the patent, make and sell the invention free of competition.

These inventions are usually of the so-called improvement type in which the inventor makes an improvement over the general knowledge then existing. The patent laws are not concerned with who owned or produced such general knowledge, but reward the inventor for his particular improvement. Thus the patent system provides a means for a small business to compete successfully with larger businesses.

The patent policy of the AEC, as set forth in the AEC manual in chapter 9113 and as we understand it, requires that the AEC obtain title to all inventions made in the course of or in connection with any AEC contract. This policy was initiated in the period following World War II when the United States and its allies still maintained a tight shroud of secrecy around the atomic energy program. Except for those contractors who were called upon to assist in the Government program, private industry had little information upon which to base its own technology.

Since that time through the access program, broader base contracting, and declassification, a vast bulk of information on the power applications of atomic energy has become freely available to industry. To this fund of information industry, by its own efforts and at its own expense, has added a great amount of new knowledge.

In addition, private industry has, over the years, accumulated a vast quantity of proprietary technical information in many fields which is absolutely necessary to the furtherance of the atomic energy program. Yet the present AEC contract policy gives no recognition of the change in the environment or of the proprietary rights of private industry in its own technical knowledge.

Although the contracting policy set forth in the AEC manual chapter 9113 purports to be the entire patent policy, we have found that there are many exceptions, additions and changes which have been made to this policy, depending upon the particular negotiating posi-

tion of the contractor and circumstances of the contract. The availability of any common exceptions, changes or additions and the conditions under which they will be granted, should be made a part of the published patent policy of the Commission, in order that all contractors will receive comparable treatment without regard to their negotiating experience or position.

Moreover, the nature of the AEC contracting policy is made unclear by the lack of a publicly known policy on issuing section 152 waivers. Although the power to issue such waivers has existed for more than 3 years, there has been no official statement by the Commission as to the proper circumstances for issuing them. In fact, it appears that normally the waiver will not be issued to a party who makes a formal contract with the Commission, even when the contract contains a negotiated patent-rights clause.

Since the Commission is in a position at that time to define the scope of the work of the contract and set forth its desired patent rights, no contractor should have to operate with the possibility of section 152 being applied at a future date to negate the terms of the contract.

It would seem appropriate that the Commission in each of its contracts should issue an express written waiver of its rights to any inventions except as otherwise specifically provided inthe contract.

When considering the position of the AEC as the major purchaser of equipment, its present contracting policy, the extremely broad language of section 152 which seems to encompass almost any Government relationship, and the limited issuance of section 152 waivers, the Commission has been able to get the suppliers of equipment to contract away their patent rights, thus the AEC has largely removed the improvement patent invention from the power reactor business.

One of the ultimate effects of a continuance of this patent policy would probably be the elimination of small businesses from the power program because their limited financial resources will not absorb the continuing losses when there is no opportunity to obtain patent rights to their own engineering products. The larger companies having a greater financial capability will be able to absorb such losses over a longer period.

The reactor manufacturers realize that the Government has made and will continue to make large investments in the atomic energy field.

Also, we recognize that most of the basic reactor technology was acquired at the Government expense. At the same time, I think it well to point out that most of this technology arose out of the very great technological background of private industry which was made available.

Our country's present position in the atomic energy field is due in large measure to the skill and training invested in the industrial manpower working in the field. Adequate recognition of this fact is overdue.

We understand that this hearing has as one of its purposes, to examine the current patent policy and to recommend what changes should be made for the best interests of the Nation.

Although it may appear that the Government is best protected by taking all patent rights in AEC contracts, this would appear to be at the expense of carrying a relatively sick industry. At the present time power reactors in this country appear in general economically

unattractive, and according to current estimates, this situation is likely to continue for a while in most areas. Private industry is finding that the cost of continuing in the development of power applications of atomic energy is very high and that large investments must be made for protracted periods before there are likely to be profits returned to pay off such investments.

Industry has already seen examples of companies who have decided to withdraw or limit their participation. It is believed that this trend will continue, unless the Government finds a way of increasing the incentive to private industry.

It is well recognized that the Government is, and will continue to be, the principal customer for power reactors. The relative health of the atomic industry will, in a large measure, be the direct result of the economic incentive gained in the AEC contracts.

From a financial viewpoint the least expensive incentive would be to allow the contractor to retain all the patent rights. This would cost nothing in that particular contract and should make it attractive to industrial bidders.

Conversely, if the Government retains the patent rights and uses some other form of incentive, it seems obvious that the incentive will require more dollars per contract.

We recognize that there may be occasions where the Government wishes to accomplish a basic research and development job, the results of which are to be made available to the general public. We believe this can best be done by a true employment arrangement.

For instance, if the job were small enough for one man to do, he would be paid a salary and expenses to perform the task. The salary includes his profit. If the Government wants to hire a corporation to accomplish this task, it seems only right that the corporation should be paid a profit fee in addition to its costs. This was the genesis of the cost-plus-fixed-fee contract.

In the recent past, however, the Government has placed certain contracts involving research and development on a cost reimbursement arrangement in which the companies work without profit, and usually at a loss because the Government does not always accept the contractors' views as to what constitutes cost. In this type of contract the contractor becomes in effect a partner rather than an employee, without receiving the rights due a partner. In these contracts it is the practice of the AEC to take all patent rights in the atomic energy field and to have the contractor also agree to give the Government the right to use any of the contractor's proprietary rights, such as patents and know-how, which are used in the contract work. These contracts contain no reimbursement for the loss of these proprietary rights.

In view of our above views on the cost reimbursement type contract, it seems even more unjust that the Government should take patents or acquire rights in background information when it is purchasing equipment on a fixed price contract resulting from competitive bidding. This is the situation in our nuclear merchant ship reactor contract.

Inasmuch as the Government is paying a competitively bid price for this unit, it is getting a reactor at the lowest price.

However, the Government also required that we give up our rights to inventions made in the course of the contract work and to license

it to use any background proprietary information incorporated in the reactor to be delivered. If a company encounters unexpected engineering and fabrication difficulties it may lose money. Yet without owning patent covering the special features arising from our ingenuity which are incorporated in the delivered reactor plant, we are in a much poorer competitive position than in our commercial boiler business.

It has been argued that the Government maintains its present patent policy to preclude those who have been Government contractors from obtaining a basic position in the industry. It is my company's contention that the reactor technology has now advanced so far that if the door were flung open today no one could obtain a basic patent position which would preempt to a particular manufacturer a general form of reactor.

For instance, we do not believe it is possible for anyone to obtain a patent which would stop others from building pressurized water, boiling or nonboiling; sodium cooled graphite moderated; aqueous homogeneous or a liquid metal fuel homogeneous reactor, to name a few.

By allowing a manufacturer to retain "improvement" patent rights it would be possible, however, for each manufacturer to build his specific form of these reactors; thus promoting competitive improvements in basic reactor types. We believe that this would encourage industry and help reactor manufacturers to earn something in the business.

There are many phases of the atomic energy business with which the Commission deals which are not concerned directly with the fission process but which contractually, however, are guided by the same policy as applies to reactors. This equipment is usually bought under a fixed price bid, and though it is modified for nuclear application, however, a large percent of the technology necessary to build the equipment is already in the hands of the prospective supplier.

Examples of such equipment are pumps, pressure vessels, heat exchangers, steam washing devices, welding equipment and the like. Yet the AEC contracting policy requires that any inventions made in the course of these contracts should become the property of the Government. For the most part this equipment is purchased using fixed price bids. The companies submitting such bids are often not in a position to get the job and still include any research and development costs. In recognition of the equities involved, the Defense Department allows such a contractor to retain exclusive rights to his inventions in supply contracts. We believe that the AEC should adopt substantially the same policy.

These comments have been directed to the patent policy in general but a few words should be said specifically about the foreign patent situation.

Although the patent policy of the AEC as published, deals only sparingly with the subject of foreign patent rights, we emphasize that such rights are very important to American industry attempting to do business abroad. In many respects foreign patents are more important to the conduct of a contractor's foreign business than are domestic patents to his business in this country.

Apparently, the Commission's policy with respect to foreign patent rights under AEC contracts is the same as that applied for domestic patent rights. It does not appear that all of the rationale for acquir-

ing the U.S. patent rights applies with equal force to acquiring foreign rights. The Government does not need such patent rights nor is it likely to use the patent rights abroad in the same manner in which it would in this country.

In our opinion, it appears likely that reactors may be sold for use in certain parts of the world in the very near future at a cost competitive with other forms of generated power. Accordingly, there is a greater chance that reactors will be sold to private customers abroad than to similar customers in this country. The urgency on the part of the AEC for helping American industry sell abroad is perhaps greater than the need for policy changes to help U.S. sales of reactors.

I urge the Commission to give careful consideration to its foreign patent rights policy and to adopt a policy of granting more liberal patent rights to its contractors, so that they may benefit in selling their products abroad from the technical improvements which they have made.

As a company having prime contracts with the Government for reactors, we are required to negotiate subcontracts under the patent policy set forth in the AEC manual, chapter 9113.

We have found that it is virtually impossible to obtain a subcontract for major components in the primary coolant system which are not commercial items, without a prolonged patent negotiation. These subcontractors want exceptions to the published policy.

We, as a prime contractor, are not in a position to agree to anything but act as an intermediary between the AEC and the proposed subcontractor. It appears to us that the necessity for negotiating patent rights in such situations on a regular basis is an indication that the policy of the Commission is inequitable and overreaching. We might add that we have never had this difficulty as a prime contractor in other Government contracts.

The industry is confronted with certain very broad language in the patent provisions of the Atomic Energy Act of 1954. It seems rather obvious to us that these sections cannot be interpreted literally without being grossly unjust to American industry.

For instance, standard off-the-shelf items, such as motors, vacuum tubes, heat exchangers, nuts, bolts, etc., are "useful" in atomic energy when applied thereto.

However, it would not seem that the scope of these patent sections should apply to such items and the AEC is not applying the act to these items. It is believed that the AEC can advantageously make some realistic administrative interpretations of sections 151, 152, 153, 155, and 159. These interpretations should be more specific and definite in defining the scope of the sections, so that industry may have some better guideposts upon which to found its business.

In view of the foregoing the Babcock & Wilcox Co. feels that the AEC could materially enhance the incentive for private industry to contribute to the advance of atomic energy utilization if the Commission would adopt the following recommendations:

A. The published contracting policy on patent rights should be expanded to include common exceptions to the present published policy and the circumstances under which they would be granted.

B. Administrative interpretations of the Atomic Energy Act patent sections, and particularly of sections 151, 152, 153, 155, and 159, should be issued.

C. Any contract which requires a financial contribution by the contractor should require at the most a royalty free license to the Government, for governmental use only, under any inventions made by the contractor in the course of the work.

D. Background rights of contractor should not be included in AEC contracts, except in very special cases. In such cases a reasonable amount should be paid as compensation for these rights.

E. When purchasing any equipment for a fixed price, whether or not it may involve incidental research and development by the seller, the Government should take no patent rights from the seller.

In conclusion, I would like to thank you at AEC for the opportunity to come here and state our views on how we think they can improve the situation with respect to patents in the atomic energy field.

COMBUSTION ENGINEERING, INC.,
New York, N.Y., December 16, 1957.

Re Patent Policy of the Atomic Energy Commission.

ATOMIC ENERGY COMMISSION,
Office of the General Counsel,
Washington, D.C.
(Attention: Patent Branch.)

DEAR SIRS: In response to the Commission's request that interested parties express their views with regard to the patent program in the atomic energy field, and particularly with regard to the patent program of the Commission, the following is an expression of the position of Combustion Engineering, Inc., upon this matter.

There is now a need to have the patent system of the United States operate in its normal and effective manner in the field of atomic energy; since if the system is to be credited with being at all effective it should have the opportunity to work to its fullest extent to supply the incentive for the needed progress in this field. The atomic energy industry has progressed beyond its infancy to the point where the rigorous Government control that was formerly necessary is no longer required. Such control is to a large extent still in existence, and in certain respects now acts as a deterrent to progress.

This is believed to be particularly true with regard to the handling of inventions that are made in the course of performance of a contract with the Atomic Energy Commission or a subcontract under an Atomic Energy Commission prime contract. The present policy of the Commission in vesting ownership of these inventions in the Government inevitably leads to a destruction of the incentive to invent. This is so both with regard to the employer company and the prospective inventor employee. There is no incentive for the company to urge the employee to invent because the company will not advantageously benefit with relation to its competitors, and there is no incentive for the employee since with his employer not benefiting there is no reason for his employer to benefit him.

In short, the incentive which the patent system has so long supplied for invention is completely lacking in a rather large segment of the atomic energy industry. Furthermore, this segment of the industry which operates under Commission contracts and subcontracts

is at a disadvantage insofar as patent matters are concerned in relation to foreign interests in the atomic energy field; and also is at a disadvantage in relation to those in the industry operating privately or independently of the Commission, since these latter may patent their inventions and build up a patent position whereas those operating under Commission contracts and subcontracts cannot so do.

The policy of the Commission as to inventions made under Commission contracts and subcontracts accordingly should be changed to restore the incentive to invent. The Commission should retain, at most, a nonexclusive license in the invention restricted to governmental purposes, and the inventor or his employer should keep all other rights, including foreign rights. Such a change would benefit all concerned and, it is believed, accelerate advancement in the field of atomic energy.

In the field of foreign patents a very serious problem results from the Commission's policy of taking the rights to inventions made under Commission contracts and subcontracts. The filing of foreign patent applications by the Commission on these inventions is apparently on a very selective basis, both as to the inventions that are filed upon and the countries in which applications are filed; and even when the Commission does not file a patent application in foreign countries, the inventor or his employer is not given the foreign rights in the invention. This policy can lead to foreign interests patenting inventions in foreign countries which may have been made first in the United States and accordingly excluding U.S. interests from utilizing these inventions in foreign countries. Such policy of the Commission with regard to foreign rights is believed to be very detrimental to U.S. interests, and it is urged that it be changed and that the inventor or his employer retain all foreign rights in inventions made under Commission contracts and subcontracts.

Respectfully submitted.

COMBUSTION ENGINEERING, INC.,
C. F. BRYANT.

AMERICAN PUBLIC POWER ASSOCIATION,
Washington, D. C., April 10, 1958.

U.S. ATOMIC ENERGY COMMISSION,
Office of the General Counsel,
Patent Branch, Washington, D.C.

GENTLEMEN: I appreciate this opportunity to transmit for your consideration the views of the American Public Power Association on patent policies in the field of atomic energy. I would have preferred to present these views in person, in response to your general invitation of March 3, 1958, but I will be out of town on April 15, as will other qualified association representatives.

The association has a direct interest in patent policies in the atomic power field because of their possible effect on the rate of atomic power development and on the costs of atomic power plant equipment. As an organization representing more than 800 local publicly owned electric systems, we have been concerned for some years with public policies in respect to patents in the developing industry of nuclear power.

The association believes that any patentable inventions developed because of publicly financed programs should be in the public domain, with no special advantage accruing to any private interest. Where patents arise from privately financed work in the atomic power field, the owner of the patent, in our opinion, certainly is entitled to reasonable compensation. At the same time, we consistently have advocated public policies which would prevent the development of monopolistic patterns in the nuclear power equipment industry through the restrictive exercise of patent rights. Whatever needs to be done should be done to prevent the growth of unregulated patent monopolies in this field.

The danger to free competition which would be posed by unregulated patent monopolies is not a theoretical question. In an address to the New York State Bar Association on January 24, 1957, the then United States Attorney General, Herbert Brownell, declared that—

> It is in the area of licensing and patents that the extent of competition in civilian development of atomic energy will largely be determined.

The recent antitrust cases in the electronics and the telephone equipment industries illustrate how restrictive patent practices by industry can lead to situations inconsistent with and damaging to a system of free competition in private enterprise.

Beyond this, these and other cases have demonstrated the great difficulties encountered, and the lengthy investigation and litigation involved in attempting to remedy anticompetitive practices once they have become established in a major industry. The atomic power industry is a new industry and only in its formative stages. In the speech referred to above, Attorney General Brownell referred also to this aspect of the situation, stating that:

> The Department of Justice is eager to meet the unique challenge presented by this new industry. We nave an important role to pay in fostering competition. We here have an opportunity to utilize preventive rather than merely remedial action. We must act to prevent anticompetitive tendencies before they mature into monopolistic patterns.

One of the legal provisions which enables "preventive action" and to which Mr. Brownell referred is section 153 of the Atomic Energy Act of 1954, which authorizes the Atomic Energy Commission to require the cross-licensing of privately owned patents when this is in the public interest. Yet this entire section will be of no force and effect in respect to any patent the application for which is filed after September 1, 1959. Thus, under the language of subsection h of section 153, within less than 17 months the Government will lose all authority to take "preventive action" in regard to the monopolistic use of privately owned patents applied for thereafter.

The American Public Power Association opposed the granting of unrestricted private patent rights as proposed by some in 1954 and took the position that a 5-year period of compulsory cross-licensing was entirely too short a period in view of the status of the technology. In a statement submitted to the Joint Committee on Atomic Energy on February 10, 1955, this association declared that:

> Under this provision (sec. 153 h) any patent applied for after this date, approximately 5 years hence, would not come under the control of the Atomic Energy Commission. The announced schedule of power reactor development indicates it is not conceivable that developments in the field of industrial application of atomic energy will be accomplished so rapidly that the Government

can abandon the protection to its present position in this field to quickly without at the same time affording a basis for the development of a patent monopoly.

This remains our position. As year has followed year, it has become abundantly clear that the development of atomic power technology will still be in an early stage as of September 1, 1959. There were those in 1954 who expected the technology to be developed with great celerity and used this expectation to rationalize the establishment of only a 5-year period during which patents applied for could be subjected to compulsory cross-licensing. Even the Commission's expectations at that time of the rapidity with which the technology and the industry would develop have proved over-optimistic. Thus, in an address of April 1, 1955, to the American Power Conference, Mr. W. Kenneth Davis, Director of Reactor Development for the Commission, felt able to predict that on the basis of assumptions which seemed to him reasonable "we should have about 2 million kilowatts of nuclear power capability in service by the end of 1960 * * *." However, it now appears that we will have only about 500,000 kilowatts of nuclear power capability in service by the end of 1960.

Industry was equally or perhaps more optimistic. Thus, according to AEC press releases at the time, the original proposal of the Yankee Atomic Electric Co. envisioned a completion date for their 134,000 kilowatt atomic powerplant of "late 1957." Similarly, the original proposal of the Power Reactor Development Co. carried an expected completion date of "late 1958." Both of these projects are now expected to be completed in 1960 and probably will not be in full operation until sometime in 1961. The slippages in the schedules of these and almost all other nuclear power projects illustrate that any expectations that the technology would be approaching mature development by September 1959 were not well founded. The fact is that, aside from the 60,000 kilowatt pressurized water reactor at Shippingport, Pa., there will be no large nuclear powerplant completed in this country prior to September 1959.

As of the present, there seems to be general agreement that nuclear plants capable of producing power at costs competitive even in the high fuel cost areas of the United States will not be developed before 1964. These plants, it is believed, will by no means represent the most advanced types of nuclear power facilities which can be developed, and very substantial improvements in design and fabrication are expected to be achieved in the years following.

It has been argued that the basic inventions have already been made in the atomic power field and that there is hardly a conceivable opportunity for anyone to develop and patent an invention of such importance that it could be used to establish a monopolistic or near monopolistic control over an important aspect of the equipment manufacturing industry. The illusion that "everything has been invented" has been a common one, probably throughout the history of mankind, and it has yet to prove a correct assessment of the future. There is no reason to put any reliance on this kind of speculation in respect to the atomic power equipment industry.

As an illustration of the continuing possibilities for basic inventions and patents in the field of power generation, one need only refer to a news story which appeared in the Washington Star of March 23, 1958. The article reported in some detail on a device developed by two professors at the Massachusetts Institute of Technology, which they

called a "thermo-electron engine," in which two metal plates are heated to differential temperatures in a vacuum. It was claimed that by use of this device, with no moving parts, the heat had successfully been transformed into electric power with an efficiency of 12 percent. According to the article, efficiencies of 30 percent might be attainable eventually. The inventors, it was said, have applied for a patent on the device. Whether or not the optimism of the inventors in this particular case proves justified, the account illustrates the folly of predicting that by some given date all the important inventions in a major technological field will have been made. Yet this is in effect what was done in the Atomic Energy Act of 1954.

In addition to the fission power field, it is important to recognize that the cross-licensing provisions in the act would apply also to patents in the field of controlled thermonuclear reactions. This entire field is still in the laboratory research stage, yet there is confidence that eventually we will learn how to control the fusion reaction and use the energy released to produce large quantities of electric power. If the present provisions of the Atomic Energy Act of 1954 are allowed to stand, there will be no provision for preventing the development of patent monopolies in this potentially vital area. There is good reason to believe that if the controlled fusion development efforts are successful, the major technological advances will come after and not before September 1959.

Although the bulk of the research and development in this field to date is publicly financed, several private industrial firms are conducting research in the field and can be expected to apply for patents on any inventions they may develop. It seems essential that the Government retain the ability to take "preventive action" to forestall anticompetitive developments in this prospective new technology as well as in the fission power field.

It has been argued that compulsory cross-licensing of private patents is inimical to the private enterprise system. This association does not share this view. In our opinion, the authority of the Government to compel patent licensing, with reasonable compensation, when this is found to be in the public interest is not intended and should not be administered as a punitive measure against the private enterprise system. We regard it as a vital power to preserve the private enterprise system and, specifically, the opportunity for free competition in the equipment industry. We regard it as a protection to private industrial firms against domination of the field by a few firms holding key patents.

For an informed opinion on the need for compulsory licensing, I refer you to the following passage in an address of December 13, 1955, in Cleveland, Ohio, by Mr. Casper Ooms, at one time the U.S. Commissioner of Patents, and the Chairman of the AEC Patent Compensation Board since its establishment in 1949:

> The possibility of the issuance of a single patent on an invention of the scope of those made by people like Fermi, Seaborg, or Dunning compels one to face the fact that the possibility exists that in this young industry a dominating patent may appear which may forbid all competing activity in the area. One can say with some assurance that almost any American industry that would procure such a patent, or any American citizen that might procure such a patent, would freely license it to the industry at large. One can say that with assurance, but no positive assurance. It is against the contingency of the appearance of a single dominating patent in the hands of an unyielding owner who might refuse to

license it and thus handicap the entire field of atomic energy activity, that the compulsory licensing provisions of atomic energy legislation are designed. However remote the contingency, the fact that it exists justifies the creation of this reserve power of compulsory licensing to insure that no unnecessary obstacle be raised against the bright promise of this great industry.

Other proponents of compulsory licensing have argued that compulsory licensing is necessary in order to prevent the creation of a monopoly. The Atomic Act of 1954, reflecting these fears, contains special provisions to prevent the creation of a monopoly. Any monopoly that might be created as a patent monopoly would be legal, and no thrust of antitrust legislation, or even the special provisions of the Atomic Energy Act, would reach it.

Any monopoly created under a patent is obviously a legal monopoly and not within the reach of the antitrust laws, if the patent holder does no more than exercise the rights created by the patent. No patent of itself creates an illegal monopoly. It is only transactions and contracts or the combination of patents which create illegal monopolies. The possibility of any single patent arising which may create a monopoly in atomic energy because of the peculiarly dominating character of the patent may be quite remote but nevertheless sufficiently real that as long as apprehension continues that this possibility may be realized, some provision should be made for it. A properly guarded and restricted provision to permit the Commission to exercise a reserve power of subjecting any dominating patent to compulsory licensing seems at this stage to be a necessary part of atomic energy legislation. The very restricted provision for compulsory licensing which is found in the 1954 act accomplishes this purpose.

The American Public Power Association has recommended on several occasions that the expiration date for section 153 of the Atomic Energy Act of 1954 be substantially extended. I urge, on behalf of the association, that the Atomic Energy Commission include in any recommendations it may make to the Congress for amendment of the Atomic Energy Act a recommendation that section 153 h. be amended to extend the expiration date at least to September 1969, or, alternatively, to eliminate the expiration date entirely and make the cross-licensing authority of indefinite duration.

I would greatly appreciate your making this letter a part of the record of your April 15 meeting on the AEC patent program.

Sincerely,

ALEX RADIN.

ARMOUR RESEARCH FOUNDATION OF
ILLINOIS INSTITUTE OF TECHNOLOGY,
TECHNOLOGY CENTER,
Chicago, Ill., December 16, 1957.

ATOMIC ENERGY COMMISSION,
Office of the General Counsel, Washington, D.C.
(Attention: Patent Branch).

GENTLEMEN: In connection with the review of the atomic energy patent program, the foundation appreciates the opportunity to submit the following comments:

It is our opinion that the Commission's policy of deciding after the fact the ownership of patents which might evolve from a research program sponsored by the Commission is a deterrent to industrial participation in the Commission's research activities. The policy has been interpreted so broadly as to prevent a prospective contractor from protecting proprietary developments.

It is recognized that the field of atomic energy has been developed out of taxpayer's money and, therefore, we appreciate the feeling of the Commission in attempting to prevent further payment by the

taxpayer in order to benefit from those developments for which he has already paid. Nevertheless, industry cannot be expected to risk money in developing a field to which it cannot be somewhat assured of a competitive advantage. To the extent that the Commission's policy prevents industry from undertaking such a development, the taxpayer does not benefit since there is no product for him to use.

It is felt that the policy of the Department of Defense with regard to patents which requires that the Government receive only an irrevocable royalty-free license to patents which arise out of work performed for the Department of Defense provides the greatest incentive to industry without completely ignoring the Government participation in the program. It may well be agreed that the present policy of the Commission was desirable during the earlier days of the development of atomic energy, however, it appears that additional incentives must be made available if industry is to develop this field for peacetime uses.

Very truly yours,

FRED KREMER, JR., *Business Manager.*

STATEMENT BY ATOMICS INTERNATIONAL, A DIVISION OF NORTH AMERICAN AVIATION, INC., ON ATOMIC ENERGY PATENT PROGRAM

(Submitted to the U.S. Atomic Energy Commission in response to an invitation appearing in the Federal Register of November 19, 1957)

CONTRACT POLICY

Crisis in atomic energy industry

The atomic energy program in the United States is today at a crossroads, and it is uncertain what the future direction of the industry will be. It is not clear whether the industry in its commercial phases will be developed by private industry or whether there will be a nationalized industry, the path which Great Britain has followed. Members of the Joint Senate-House Committee on Atomic Energy of both parties see the need for more rapid development of economic nuclear power as essential for maintaining the world prestige and influence of the United States; considerable fear has been repeatedly expressed that the British and Russians may outstrip us in nuclear development and result in the loss of international markets to the United States. The foreign reactor market not only has a bearing on our diplomatic prestige, but on the economic life of the United States.

Recent months have seen several disquieting events in our domestic program. The November issue of Nucleonics magazine lists a number of companies prominent in atomic energy development which have either withdrawn from the field or drastically reduced their activities. Still other companies with no expressed intention of withdrawing from the field have suffered considerable financial losses. Losses, rather than profits, have been the rule with those firms which have undertaken commercial reactor projects, particularly those undertaken on a fixed price basis.

Reasons for crisis

A number of reasons are apparent for the current situation of doubt and hesitancy. Economic incentive is lacking because there is no

broad market nor great domestic need for the current high cost reactors; this is undoubtedly a basic reason for the current economic situation. Certainly many who entered this field were naive in their approach and the glamour surrounding atomic energy obscured very real problems. The requirements of major investment over long periods without the possibility of immediate return may not have been fully appreciated, and the amount of current business may be insufficient to support all those who have entered the field. Until the time nuclear reactors are developed to economic competitiveness with conventional powerplants, the market will remain small and economically unremunerative.

The private industrial contractors of AEC can justify their participation only on the basis of future business, for their present return is completely out of proportion to the efforts involved. The contractor must supply a large facility and staff it with highly qualified and scarce technical personnel who might better be employed in more financially rewarding programs. The fees received in research activity are very small, particularly as compared with larger dollar volume manufacturing activities. The contracts are always subject to termination and the risk of next year's budget; and the administrative and management demands on a corporation are frequently out of proportion to the company's overall business.

Given the present situation of lack of economic incentive, absence of any strong commercial demand for nuclear power, a long development period before economic nuclear power is achieved, current financial losses, difficult technical problems to be overcome, and large investments of funds and skills for a meager return under Government contracts, some appreciation can be had for the discouraging reappraisal which many firms are now giving their nuclear energy commitments.

Denial of proprietary position to industry contributes to crisis

In spite of these difficulties, many companies would still be willing to undertake the long-term large financial commitments required for participating in the Government program for development of atomic energy, but are deterred by their inability to establish a proprietary position under a policy which has retained title to patents in Government since inception of the Manhattan project 15 years ago. AEC contractors and potential contractors cannot foresee, without a proprietary position, a basis for eventual compensation for their efforts. While certain financial return can never be guaranteed under our economic system, nonetheless, the possibility of such return as a vital incentive should not be eliminated. The inability to obtain a proprietary position encourages a corporate policy of caution; there is a feeling implicit in the attitudes of those who have temporarily withdrawn that the work of others can still be followed, and the field reentered at a later time without disadvantage. This tendency to let others do it can have a paralyzing effect on technical progress.

AEC patent policy novel experiment

The present patent policy of AEC of retaining title to patents is a novel experiment in Government-contractor relationships not required by the Atomic Energy Act. It varies strikingly from the long-practiced policies of the Armed Forces. In armed services contracts, the contractor retains patent rights, with a royalty-free license to the

Government, which is sufficient to protect Government operations from patent restrictions. This policy has encouraged able firms to to seek Government contracts and has stimulated the further development and marketing of the resulting products. The further development and marketing of products originally created under contract has been to the greater benefit of the American public and is an added return from the initial Government investment.

The present Government ownership of atomic energy patents is similar to that of countries with nationalized or socialized atomic energy industries, such as Great Britain. American industry suffers the disadvantages of nationalization without the accompanying rewards of assured markets due to Government efforts.

Original basis for AEC patent policy

In reviewing the current status of the atomic energy industry in relation to the patent policies followed by AEC, it might be helpful to consider the original premises upon which these policies were based, and to see if these premises are still valid 15 years after their inception. The atomic energy industry was born of a wartime emergency and had as its principal goal development of atomic weapons. The public's original feelings were of great uniqueness and unparalleled opportunity, mixed with fear of radiation and explosion. Although the potential applications for power, medicine, and agriculture were always apparent, the great initial emphasis was upon the military aspect.

The debate surrounding the Atomic Energy Act of 1946 was largely over the issue of military versus civilian control over atomic energy. There was little public discussion regarding the effect on our economic system of the Government monopoly over the industry; Government control was accepted without strenuous objection or serious examination. Patent rights were in effect abolished in the atomic energy field by the 1946 act. At the time of the passage of the Atomic Energy Act of 1954, which was designed to reduce the Government monopoly in the atomic energy field and encourage private participation, there was still great concern that the early contractors of AEC did not acquire a preferential commercial position by virtue of their Government work.

The patent provisions of the 1954 act reflect this concern. Atomic energy technology was largely classified during these years and not available to the general public; this compounded the feelings on the "insider" problem. While these feelings were understandable in theory, overlooked in the discussion on the development of atomic energy with Government funds was that the success of the programs was largely due to the great technical abilities the participating companies brought to the programs. There was also concern that if patent rights were left in the developer, basic patents might possibly be obtained, leading to patent concentration in a few hands. This problem has been successfully handled by the armed services by obtaining a nonexclusive license from its contractors, while leaving ownership of the patent with the contractor.

Another reason initially offered for strict Government control over atomic energy was the fear, expressed in a 1946 Senate report, that sudden introduction of atomic energy might result in economic disorganization and large investments might be rendered obsolete. This feeling that atomic energy was a "ripe plum" waiting for exploita-

tion, which loomed large in public debate, seems strange when the current economic situation and the relatively slow rate of technical progress are reviewed. However, it helps to explain the elaborate precautions taken against preferential or monopolistic positions being acquired by the early Commission contractors. The patent policies of AEC were formulated in this environment. The basic patent clauses that were included in the Commission contracts of many years ago are retained unaltered today in spite of the drastically changed conditions faced by the industry.

Original basis for AEC patent policy no longer exists

No private organization has a patent or proprietary position of any consequence in the atomic energy field. Atomic energy technology is largely declassified today outside of military applications, and this information is available to the general public. Furthermore, even classified information is available under the civilian application program, which allows private parties to review technical progress with the view of further development. The list of AEC contractors runs into the thousands. Even though the basis for the original AEC patent policy—the concern over the insider problem—is clearly no longer present, the policy is still being continued. The policy which had the purpose of preventing any single firm from getting ahead has contributed to the current shakeout in the industry, and instead of stimulating greater private activities, the effect has been to reduce such activities.

Overhaul of patent policy needed

Given this background of a patent policy which has not changed since the initial days of the Manhattan project, although the factual justification for the policy has altered markedly, and the contribution this has made to the current crisis in the industry, consideration should be given to the complete overhaul of the Commission patent program to permit its contractors to retain patent rights.

Contractors retaining patents would stimulate development

Apart from the tangible benefits of such a change, the psychological impact on industry would be immense; it would be an indication to industry that financial returns may yet be had. Stimulation and encouragement would be given for investment, development, manufacture, and marketing of atomic energy products. Because of the peculiar prestige value of patents in our industry, the psychological effect might even exceed the tangible and real benefits.

The possibility of a proprietary position would retard the withdrawal of companies from Commission programs and increase competition among able firms for Commission contracts, with resulting benefit to the Commission. Companies could no longer feel that there was no reason to participate in Commission programs because the results of work by others would be available for their use at a later date; it would be risky not to participate, and resources and manpower which are now applied in more conventional and profitable manufacturing activities might be redirected.

Continued Government ownership of patents not sound

The policy which had its philosophical basis in the premise that developments made at Government expense should be available to the public has shown itself over the years to have overlooked several

fundamental features of our economic system which the patent grant has historically served to supplement. A development which may be freely employed by everyone may not be used by anyone if there is not the legal protection provided by the patent to cover the risks entailed in the marketing of the product; sound financial investment requires at least the possibility of some return. The policy designed to prevent advantage to willing and able companies in favor of unknown possible future participants has had the effect of retarding progress to the detriment of the public. Instead of stimulating more participation, the effect has been to reduce participation.

The position that inventions developed at Government expense should remain in Government hands, although superficially logical, includes an assumption that the Government operates in a proprietary capacity and it should extract every competitive advantage possible from its contractors. This reasoning overlooks an overriding responsibility of Government in promoting policies that are to the greater benefit of the American public and not to itself as a proprietary entity. The proper test of policy should be in what manner may atomic energy be most rapidly and effectively developed and the resulting benefits delivered to the people.

Using this enlightened test of public interest, it is believed that it can best be accomplished by leaving patent rights in the hands of a developing contractor. Before a contractor could profit from his patent right, capital would have to be applied in further development and manufacture and the product sold; the rights thus obtained are not outright gifts but only a stimulus to further investment and activity.

Government role in development of other industries

The propriety of the grant of such rights, which would not involve outright expenditure by Government, can be readily understood by relating it to the role Government has historically and traditionally played in the development of other industries in the United States within the framework of a private enterprise economy. A number of other industries would not have been able to develop during their early unprofitable stages without Government support; such support was granted with the view of ultimately eliminating Government subsidy, and the growth of the industry and the wisdom of the Government policy is gaged by the eventual reduction or elimination of such support. Ready examples are found in the development of our railroads, shipping lines, and air transportation industry. The role of Government in the development of these industries was to supplement and not supplant private effort. Similarly the retention of patent rights by the contractor should be viewed here as a stimulus to the development of the atomic energy industry which will ultimately provide the greatest return to the American public for its investment.

Patent concentration fear not valid

The fear expressed many years ago of patent concentration is similarly no longer valid today. The large number of AEC contractors would alone prevent patent concentration in any small group. Furthermore, the antitrust laws are as operative on atomic energy patents as on any others. The passage of time has also reduced the opportunity for the obtainment of basic patents that would dominate a whole field. Historically, basic patents have been ob-

tained only in new, virgin fields. When an art has developed to the stage of the atomic energy field, new patents are of lesser scope and directed toward protection of specific improvements. Another historical function of the patent grant which has not received sufficient attention in the atomic energy field is the stimulus it serves to further invention.

When a particular development is covered by a patent and is unavailable for use by another, the new party has to resort to further development and exercise of ingenuity to get around the patent; often improved patentable developments have resulted, rather than unproductive imitations. The often expressed fear of patent suppression is similarly unfounded because return cannot be had on a patented product until it is marketed; the information contained in the patent, being a public document, is, of course, available to the public.

Summary

It is believed that the present outmoded AEC patent policy is foreign to our patent system and contrary to precious practices of the Government, and is modeled on that of foreign governments with nationalized industry. The original premises on which this policy is founded, that of limited access by a few contractors to secret information and the feelings of mystery, strangeness, and danger surrounding the birth of atomic energy, no longer exist. The national interest will be best served by the most rapid return of atomic energy to the domain of free enterprise economy.

Patent rights, if retained in private hands, will provide stimulation to an industry, which being faced with the prospects of long-term investments without return, is undertaking a sobering and generally negative reevaluation of its commitments. The risks incident to the development and marketing of atomic energy are under any circumstances very great. To reduce these risks and encourage private investment is a function of enlightended Government policy in which the patent system should be permitted to play the role it successfully has throughout our history to the enrichment of our people in a system of free economy.

ADMINISTRATION POLICIES

Present policies do not encourage private endeavor

The administration of contracts and of tbe Atomic Energy Act by the Commission, as it relates to patents, should be clarified and modified to stimulate private endeavor both within and without the Government program. A prevalent impression of the Commission patent program which properly or improperly is held by a large segment of the patent profession and by industry is that its purpose is to discourage private activity and to maintain atomic energy as a state monopoly. Reasons which have been cited for this opinion include denial of patent rights to contractors; administration of contract patent clauses beyond their already broad language, where even a slight and insignificant connection with the contract demands assignment of the patent to the Government; the requirement for transfer of inventions to the Government made with rental equipment; and above all, the absence of a general policy with regard to administration of section 152 of the Atomic Energy Act of 1954.

Damaging effects of section 152

Section 152 of the Atomic Energy Act holds that any invention—

> * * * made or conceived under any contract, subcontract, arrangement, or other relationship with the Commission, regardless of whether the contract or arrangement involved the expenditure of funds by the Commission, shall be deemed to have been made or conceived by the Commission. * * *

The statute gives to the Commission, however, unlimited waiver power. It is recognized and appreciated that administration of this section with its broad and indefinite language creates many problems for the Commission and the Patent Office. Admiral Strauss expressed his own doubts on the practicability of an earlier version of the present section 152 on June 3, 1954, in testimony before Congress during hearings on the 1954 act. He stated that the section would place a burden on the Commission and "* * * might require us to be not only judges but clairvoyant".

The general effect of section 152 on the industry has been most damaging. It has had a dampening effect on private investment, it has discouraged communications and proposals to the Commission, and has inhibited further practical utilization and development of information developed under contract. It has had a particularly severe effect on contractors whose primary business is with the Commission, but who desire to conduct some private research, particularly in fields the Commission has no interest or does not wish to support further. These contractors hesitate to undertake such work for fear that conducting private and Commission work in the same facility would be considered "an arrangement or other relationship" entitling the Government to any resulting patents. It has been suggested that the facilities problem might be avoided by completely separating physical facilities, with one for Government work and one for private work. However, this view is both unrealistic and economically unsound. Few firms have the capital resources necessary to support two separate organizations, particularly since the volume of private business is presently small. Insistence on separate facilities would prevent development work by all but the very large companies, which could stand the losses, and consequently would favor economic concentration. Furthermore, even among those companies which have established separate facilities with the view of conducting only private research, there have been intimations that Government contracts would be necessary to augment the relatively small volume of commercial business.

Commission should clarify position on section 152

Pending legislative changes in section 152 as discussed below under "Legislation," it is urged that the Commission issue a general policy statement to clarify its position regarding section 152. The statute grants the Commission broad waiver rights and there are therefore no legislative restrictions to such action. To date the Commission has waived its rights under section 152 only in certain limited areas; it has, for example, stated that a license is not an arrangement or relationship, nor is the use of the materials testing reactor for irradiation experiments, or is the use of isotopes purchased from the Government. The present Commission practice of ruling on section 152 matters only as a particular problem arises and its apparent unwillingness to grant even advisory opinions in the absence of a specific controversy, has a damaging effect.

One example may be found in the filing of foreign patent applications. Foreign filing must be accomplished within 1 year after American filing to obtain the benefits of the American filing date under the International Patent Convention. However, section 152 consideration by the Commission is normally reserved until such time as the American patent is ready to issue, which is usually well after the time required for foreign filing. The inventor may, therefore, be forced to undertake expensive foreign filing at his own risk, or lose the benefits of the international convention if filing is not undertaken. While it is not clear that a subsequent holding under section 152 that the American patent should be issued to the Commission embraces foreign patents acquired in the interim, nonetheless, the uncertainty creates an additional element of risk which may retard foreign filing. The Commission should clarify its policies with regard to private patent rights, to avoid any impression that it is indifferent to such rights, as has correctly or incorrectly been given by the Spevack case, wherein the inventor has thought it necessary to appeal to the Supreme Court of the United States to prevent disclosure of his heavy water invention by the Commission before foreign filing could be accomplished.

Guides for Commission exercise of waiver power under section 152

It has been observed that while the Commission's waiver rights under the statute are complete and untethered, the statute does not furnish guides for the exercise of its discretion. It is believed that by considering the original reasons for this section, its very title, and the public statements of its author, a basis can be developed for proper action by the Commission.

The section is entitled "Inventions Conceived During Commission Contracts" and its purpose was to secure to the Commission such inventions, although this is already accomplished by contract. There was no intention to appropriate inventions made with private funds under some vague or insignificant arrangement or relationship with the Government, or to discourage private initiative. The drafter of section 152, W. Sterling Cole, has admitted that the language of the section went beyond its original purpose. He has written in the April 1955 edition of "Nucleonics" that "Ironically, under the pressure of zealously trying to protect the normal American patent system, too much was written into this section."

Mr. Cole believes that "* * * the section should properly be limited to those inventions conceived under the terms of an express or implied contract with the Commission entered into for the benefit of the Commission." Mr. Cole has introduced a bill amending section 152 in this manner, as will be discussed below under "Legislation."

Recommended policy statement by AEC on section 152

Sufficient policy guidance is therefore believed available to the Commission for the exercise of its discretion. It is recommended that the Commission issue a policy statement to the effect that it will waive its rights in inventions made without expenditure of Government funds. This statement should also clarify the situation relative to the use of a contractor's facilities for both Government and private work; it should state that performing both types of work in the contractor's facilities does not, by itself, constitute an "arrangement or other relationship."

Such a statement would have a stimulating effect on private research. Investing private funds in atomic energy development is already sufficiently risky without the additional hazard that any resulting patents, which might supply some basis for return of investment, will be taken by the Government.

Equipment rental policy obsolete

Another example of the Commission patent policy, which has an adverse effect on private enterprise, are the conditions attached to the rental of Commission equipment for privately sponsored research A clause is inserted in rental contracts which in effect requires assignment of all patents to the Government. This policy very simply asks that private funds be expended in the rental of equipment and sponsorship of a program, without the private sponsor obtaining any better proprietary position that if the work were performed under Government contract for a fee.

It is obvious that such an arrangement is without incentive for the investment of private funds. A basic rationale of the Commission patent policy, whatever its soundness, is that inventions developed with Government funds should be available to the public. But this very argument supports the position that inventions developed with private funds should remain in private hands. In any event, it is evident the public will not benefit unless the inventions which are the result of development work are marketed. However, the major financial investment required for such development work cannot properly be committed without protection in the way of proprietary rights.

Summary

It is believed that the administration of Commission patent policies can be clarified and should be modified to serve the historic function of the patent system: to stimulate progress of science and technology to the betterment of the Nation. A specific responsibility should be accepted by the Commission to adopt policies which will stimulate and encourage investment of private funds in the field. Policies should be clarified so that private firms may properly evaluate their patent position before new research is undertaken, rather than afterward by case to case negotiation with the Commission.

A clarifying policy statement should be issued on section 152 limiting the Commission's rights to those arising out of contract; this would be consonant with the original purposes of this section. This statement should also indicate that the performance of Government work along with private work in a private facility does not, by itself, constitute an "arrangement or other relationship." Furthermore, the patent provisions of contracts for rental of equipment should be altered to permit retention of the patent rights in private hands. In cases where an initial preliminary discovery, not amounting to patentable invention, is made but not continued under Commission auspices, encouragement should be given to the contractor to further the work by retaining patent rights.

LEGISLATION

Special patent legislation unique to atomic energy

The Atomic Energy Act of 1946 represented the first time in the history of our patent system that a single technical field was pointed out for special legislative treatment. The general feelings of danger and uniqueness which dominated all considerations in the 1946 act required, it seemed, special patent provisions. For all practical purposes, patents in the atomic energy field were abolished. The Atomic Energy Act of 1954 later recognized the need for stimulation of invention and discovery in the atomic energy field and therefore returned patents in the atomic energy field, at least to some extent, to the operation of the general patent statutes.

The most notable alleviation was permitting the patenting of atomic energy inventions outside the weapons field. However, a number of retrogressive anomalies are contained. Included among these are a presumption of Government ownership of all patents in the atomic energy field, a section stating that secret art shall be a bar to the patenting of the same invention subsequently developed by another, and a section requiring reporting of inventions to the Commission or the filing of a patent application.

The following discussion and suggestions are offered as guides to the Commission in drafting its legislative proposals on patents to the Joint Committee on Atomic Energy.

Special patent legislation not required

It is clear that feelings of danger and special advantage to early participants, discussed previously, prompted the special legislative treatment of atomic energy patents, but it is equally clear that these conditions no longer exist. There is no sound policy justification for continuing to discriminate against the atomic energy field with special patent legislation.

The return of the normal patent climate is essential for healthy growth of the atomic energy industry and until the special patent provisions of the act are revoked, they will continue to have damaging consequences. The total repeal of the patent provisions of the act will bring the full benefits of the patent system to atomic science and will serve to promote rather than retard the development of that science. This basic position * * * that specialized legislative treatment of atomic energy patents is no longer required * * * is in accord with the conclusion reached by the "Symposium on Legal Problems on Atomic Energy," held at the University of Michigan Law School in September 1956, and is the almost universal opinion of the patent bar. The general patent and antitrust statutes will provide adequate protection to the public and the Government.

Section 152 worst feature of patent chapter

Until such time as the entire patent chapter is repealed, however, special attention should be directed toward the elimination of the most damaging features of the existing law. Without doubt section 152 is the single worst patent provision ever enacted. It states that any invention or discovery originating under any contract, subcontract, arrangement, or other relationship with the Commission is presumed to have been made by the Commission regardless of whether or not Commission funds were involved.

Mr. Casper W. Ooms, former Commissioner of Patents and Chairman of the AEC Patent Compensation Board, has called it the "most mischievous" provision of the act. Its corrosive effect on investment and initiative and the confusion it has created cannot be exaggerated. There are a number of constitutional questions which have been raised concerning section 152. The section was not included in the April 15, 1954, draft of the present law on which most of the public hearings were held. A form of the present section first appeared in the May 21, 1954 draft of the bill, but it did not contain the present presumption of Government ownership nor the procedure for settlement of a dispute between an applicant and the Government before a body of the Patent Office which Mr. Ooms has called "not at all equipped" to settle such a dispute. Some testimony, mostly adverse, was given on this version, including that by Admiral Strauss, as mentioned previously, and the section was then withdrawn in the July version of the bill. It reappeared in the August 6, 1954, conference report in its present form without any public hearings on its provisions. Mr. Cole offered it as a substitute for section 153 on compulsory licensing, but both sections were incorporated in the final bill.

Its purpose was only to secure to the Government patents made under Government contracts, but the language of the section went far beyond this, as has been regretfully recognized by Mr. Cole. The broad and indefinite language of the section places unjust burdens on the Commission, inventors, and the Patent Office. The section is unnecessary to accomplish its purpose, since the Commission can protect itself patentwise by contract. There are no special conditions in the atomic energy field, beyond those in any other field, which require statements to the Commissioner of Patents as to whether inventions were made under any contracts with the Commission. To specifically point out the atomic energy field for such a requirement again only serves to retain an unfounded uniqueness and retard the creation of a healthy industrial climate.

Mr. Cole's proposed amendment of section 152 inadequate

Mr. Cole's bill, H.R. 5694, would amend section 152 to eliminate the presumption that all patents in the atomic energy field belong to the Government and would require a statement from the inventor only as to whether the invention was made under any contract or subcontract, express or implied, entered into for the benefit of the Commission.

The "arrangement or other relationship" phrase would be eliminated. Although this amendment would be an improvement over the existing section, the question of what is an implied contract might cause trouble. In any event there is no reason for continuing to single out the atomic energy field for special treatment. The Commission has fully demonstrated its ability to obtain patent protection for the Government through contract. The American Patent Law Association and other professional groups support Mr. Cole's amendment, but only as an interim measure, with the view that outright repeal is required.

Prior art section harmful

Section 155 of the act provides that prior knowledge or use of an invention under secrecy shall be a bar to the subsequent patenting

of the same invention by another. This is departure from our patent system because secret art is not a bar to patenting under the general patent statutes. The patent system stimulates and is based on public disclosure of technical information and failure to disclose can often result in a patent being awarded to a later party. This section casts a cloud over any patent that may be issued, because there can be no assurance that at some later time a report will be declassified which will invalidate a granted patent. Furthermore, the language of the section is somewhat ambiguous and might be interpreted to prevent any patenting. Mr. Cole's bill proposes that the only type of knowledge or use which would bar patenting is that described in a paper published by the Technical Information Service of the Commission. While this amendment would soften the effects of the present section, it may be asked whether the amendment is well conceived since as many classified reports are published by the Commission contractors as by the Technical Information Service of the Commission and many other reports are available through the Department of Commerce.

Invention reporting section confusing

Sections 151(c) and (d) require that every invention in the atomic energy field be either reported to the Commission within 90 days after completion thereof or a patent application filed in the Patent Office with access thereto by the Commission.

These sections are ambiguous in a number of respects including when the report must be filed, the penalties for failing to report on time and whether the Commission may distribute the information to others. This section places unnecessary burdens on inventors, the Commission and the Patent Office.

The patent system already provides sufficient incentive to an inventor to disclose his invention. Furthermore, the Government unnecessarily intrudes into private business affairs, and the traditional secrecy of pending patent applications is violated. Mr. Cole's bill does not alleviate or clarify sections 151(c) and (d).

Compulsory licensing section

Section 153 provides for a limited system of compulsory licensing upon certain conditions. The section first requires negotiation with the patent owner for a voluntary license, followed by showings of the "primary importance" of the licensing of the patent to the atomic energy program. This section will cover all patents granted on applications filed before September 1959, and was instituted for a 5-year period to guard against the common fear of advantage to early atomic energy participants. This section is novel in our patent system and resembles that of certain European countries. It has been opposed on principal as being of doubtful constitutionality and damaging to the patent system. Positive aspects suggested are in preventing monopoly or confusion in the industry while yet compensating a patent owner.

To date there has not been a known single instance where an action for compulsory licensing under section 153 has been initiated. This is due in part to the Commission's patent hegemony, the little publicized but extremely serious problem of successfully prosecuting nuclear reactor patents of any scope through the Patent Office, and a basic lack of understanding of the nature of inventions in the nuclear field at this point in its development.

Apart from a few early patents of Enrico Fermi, which are assigned to the Commission, there are no U.S. patents in the nuclear field which would dominate the whole field. Technical progress is characteristically in small increments and no major breakthroughs, which were contemplated by the proponents of section 153, have occurred or are likely to occur. For these reasons alone, compulsory licensing, apart from matters of principle, is not needed to guard against patents of major scope to early Commission contractors.

On the other hand, the practical influence of section 153 has not warranted the major consideration and controversy it has aroused, and such controversy has unfortunately obscured the more severe effects of other sections of the act, such as section 152. Mr. Cole's bill would repeal section 153 in its entirety, along with its subsidiary section 154. The Patent Law Associations are in full accord with such repeal.

Remaining sections less important

Sections 152, 155, and 151(c) and (d) of the present act are considered to be its most damaging patent features and most in need of immediate overhaul.

The other sections are less important, inaccurate or even superfluous. As an example, section 158 was prompted by Senator Langer's desire to prevent monopolistic uses of atomic energy patents. It provides that if a court finds that an atomic energy patent has been intentionally used in violation of the antitrust laws, the patent may be licensed to licensees of the Commission at a reasonable royalty to be determined by the Patent Compensation Board created under section 157. In their fear of monopolistic uses of atomic energy, the proponents of this section overlooked that courts frequently require licensing at no royalty of patents improperly employed under the antitrust laws.

Section 151(a) and (b) prevent the patenting of an atomic weapon and revoke rights in patents to the extent that they are so useful. As a practical matter, it is not believed that atomic weapon discoveries are possible by anyone outside of the weapons laboratories of the Commission and since any inventions so made are necessarily classified, patents could never issue thereon while classified. However, the patent system in the past has stimulated weapons development in the United States in other military fields to the improvement of our military arsenal. This encouragement should not be denied in atomic weapons. There is no longer any reason to place atomic weapons on a special plane, particularly when recent events in the missile and satellite fields demonstrate the possibly greater importance of such instruments. The Government would not be denied the use of any such inventions, because statutory provisions make the Court of Claims the only recourse against the Government for patent infringement.

Section 157 creates a Patent Compensation Board and sets forth what applications may be submitted thereto, provisions for eligibility and standards for determination of awards and royalties, pursuant to other sections of the act. The purpose of this section is laudatory, in permitting inventors to obtain a reward without resort to litigation.

Approximately 26 cases have been presented to the Board, and 2 awards of considerable importance have been made; 1 to the Fermi

group for the patent on neutron moderation and nuclear transformation, developed by Fermi and his associates at the University of Rome, and to Prof. Glen Seaborg's group for its contribution to plutonium chemistry. This section might well be retained and applied throughout Government, but it should be modified to effect compensation for voluntary submissions, and should not be an adjunct of the compulsory licensing procedure and antitrust sections.

Section 159 holds that nothing in the act shall affect the rights of the Commission to obtain assignment of inventions developed under the Government contracts. This section is superfluous since it gives no rights to the Government that it does not already have, and may serve as a justification to Government for obtaining patent rights from its contractors.

Recommendation

It is recommended to the Commission that its legislative proposals to the Joint Committee include a recommendation for outright repeal of the patent chapter of the act, with a return of atomic energy patents to the general patent statutes. Special legislative treatment of atomic energy patents, whatever the original justification, is considered no longer necessary and an unfortunate anomaly. The return of atomic energy inventions to the healthy climate of the general patent statutes will be an important stimulus to technical progress in the atomic age.

Short of total repeal of the patent chapter, immediate attention should be directed toward ameliorating the worse features of the present act, namely section 152, and to a lesser extent sections 151(c) and (d) and 155. The Cole bill has serious shortcomings, but it is generally preferable to the existing statute and if practical considerations dictate that it is the only bill which might be passed immediately, its passage should be favored as an interim measure.

FOREIGN PATENTS

Foreign reactor market of major economic and political importance

The foreign market is assuming rapidly increased importance in the atomic energy field. The cost of power from conventional fuel abroad is considerably higher, and nuclear reactors are already approaching economic competitiveness there. In addition to Europe's needs for atomic power to free itself from complete dependence on foreign oil supplies, atomic energy has immense psychological, political and prestige value for its developers.

It has been estimated that the foreign market will be the primary commercial outlet for American equipment manufacturers for perhaps a decade; it may take at least that length of time for nuclear power to become competitive in the United States. The establishment of a strong foreign nuclear energy position by the United States is a cardinal principle of American foreign policy and has the enthusiastic backing of the administration, the Joint Committee, and both political parties. In fact, one of the most frequently advanced arguments for the more rapid advancement of our domestic atomic energy program, though the need for atomic power is not as pressing in the United States, is that it will serve to enhance our prestige and influence throughout the world.

Chairman Durham expressed this firm national policy in an address on May 22, 1957.

The foreign field may * * * offer our greatest opportunity. Thus the tremendous program announced by the Euratom group would seem to offer real opportunity for American atomic equipment companies to sell services and equipment during the lean development years in this country. Opportunities may also be had in Japan, Latin America, and the underdeveloped countries of Asia. I say these things advisedly, for atomic energy development has become a part of our foreign policy.

Value of foreign patents

The American manufacturer doing business abroad in any field undertakes many risks; these risks are compounded in the atomic energy field by such problems as performance warranties and possible third party liability for radiation incidents. The American manufacturer has traditionally protected his entry into the foreign market by securing patents on his products. The foreign patent grant has many real and intangible benefits. The most important value of the foreign patent is the incentive for investment of capital abroad. The patent represents industrial property which is useful in negotiation. A foreign patent portfolio would increase the attractiveness of American firms as partners in cooperative arrangements with foreign organizations. A patent is also invaluable as a counterweapon in the event of litigation brought by a European party. Patents prevent unfair appropriation of a product by others, and if necessary can be enforced. However, the very existence of a patent inhibits such appropriation and reduces litigation. The patent also has intangible but nonetheless important prestige value which may improve sales potential.

Benefits of foreign patents not available to Commission contractors

None of these benefits of foreign patents is available to American manufacturers under the current AEC patent policy. The Commission retains title to all foreign patents in atomic energy. The Commission permits its contractors to take out foreign patents but requires their assignment to the Government; this obviously affords little incentive for expenditure of private funds.

The only slight benefit resulting from Government ownership is that the inventions may be used without fear of suit by others; but the patents are in fact available to use by foreign groups and no preferential position is thus afforded American industry. All the positive benefits of foreign patents indicated above are lost, and much the same protection can be had by publication. Publication of an invention in the unclassified literature immediately bars anyone from obtaining a foreign patent thereon; this mean that anyone can use the invention without fear of patent infringement and it is therefore the general equivalent of a patent which is obtained at much greater expense but not utilized. None of the positive benefits of foreign patents can accrue to American industry by Government ownership, because the Government has historically never enforced its foreign patent holdings and has never been active in their obtainment.

Lack of foreign economic interests and fear of adverse reaction by foreign governments has prompted this policy. For the moment, American companies have been able to enter into cooperative agreements with foreign organizations without bringing a substantial patent portfolio. This is because the American firms for the time being have technical skills and experience which are attractive without proprietary rights. However, it should be recognized that our tech-

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nical lead is a rapidly wasting asset, which must be secured before the capable foreign technical organizations acquire sufficient competency to become independent. American industry must be able to acquire a foreign proprietary and equity position in the relatively near future to prevent possible loss of the foreign market, with a resulting loss of income and of world prestige and influence to the American Nation that can be ill afforded.

Foreign governments actively exploit atomic energy patents

In contrast with the policies the Commission has followed in behalf of American industry abroad, foreign Governments, including those which are in direct competition with private American firms, are very candidly and openly following active patent programs in other countries. These patients will be used to further the foreign commercial interests of these countries. Such a program is perfectly proper and legal, and must be accepted as an economic fact of life; but it does raise the need for an effective foreign patent position in American industry.

As an example of the active foreign patent programs being followed by the British and French Governments, the British Atomic Energy Authority acquired 40 patents and the French Commissariat a l'Energie Atomique acquired 19 patents in Belgium for the period October 1956–October 1957. A British atomic energy publication, Applied Atomics—World Report to Business and Industry, periodically carries a listing of Atomic Energy Authority patents available for licensing at a royalty rate estimated at 5 percent. The French Government, soon after the discovery of fission by Hahn and Strassman in 1939, obtained extremely basic reactor patents throughout the world, based on the work of Joliet-Curie, Halbein, and Kowarski. While these patents would normally have expired by now, they have been extended and are currently active in several countries, due to special moratorium provisions designed to compensate patent owners for losses caused by the late war.

Patent situation in Germany

This situation is particularly serious in Germany where the French-owned patents were first issued beginning in 1953 under the terms of law No. 8 enacted by the Allied Occupation High Commission.

These patents (see, for example, Nos. 822, 144; 902, 282; 966, 907) will, therefore, run until the mid-1960's. The broad nature of these patents (covering virtually any thermal reactor) and the traditional respect afforded Germany patents will require American manufacturers operating in Germany to pay careful attention to these documents.

The French Government has been active in the exploitation of its foreign holdings. It presently has a suit pending before the U.S. Patent Compensation Board for alleged use of French inventions by our AEC. In those countries which require compulsory licensing of a patent which has not been actively used at a royalty rate determined by the particular country's patent office, the French have petitioned to be exempted from such compulsory licensing. One example of this latter situation was found by an American manufacturer in connection with its sale of a reactor to Denmark.

Analysis of reasons offered for present AEC policy

It has been suggested that the Commission cannot grant foreign patent rights to its American contractors for several reasons. One of

these is that patents are needed for intergovernmental patent exchange agreements. One such agreement in the atomic energy field was with the British Government, as part of a mutual cooperation arrangement reached during World War II.

Under this agreement, the Governments exchanged patent holdings in each other's country but retained royalty-free licenses in the transferred patents; the exchange did not extend to third countries. The Commission has felt that such an agreement was necessary to protect its freedom of operation in the United States.

Under this agreement only the Government is protected and American industry could find itself paying royalties in Great Britain on its own inventions since royalty-free licenses were not guaranteed industry. The value of such an agreement in the atomic energy field is questioned because of the disparities in the relative technologies. Examination of those British patents which have issued to AEC in the United States (for example U.S. patent 2,807,580) indicate that they would have been of little value in British hands due to their highly restricted scope as compared with patents of generous scope which are obtainable in Britain.

Basic weakness of intergovernmental patent exchange agreements

The basic weakness of such an agreement, however, is that American industry is primarily interested in protecting and using its own products and not in employing foreign systems which are less well regarded. Even with the patent rights obtained, American industry could not effectively compete in the marketing of these products, were it so inclined, lacking complete technical information and experience with such systems, and because of higher American labor costs. Not only would American industry not have a preferential position with regard to its own developments abroad, but it might actually have to pay royalties thereon to a foreign government.

There are indications that the Commission does not regard this argument for its retention of foreign patent rights too highly. Such agreements have been infrequent and the Commission has but recently initiated an adequate foreign patent program. Furthermore, title is not needed in any event in Government for cross-licensing agreements, as contrasted with outright exchange of patents. The Government would probably require a license in foreign patents originating under contract for governmental and mutual defense purposes. This sort of a license provides sufficient flexibility for all purposes of Government.

Soundness of foreign patent rights being retained by AEC contractors

Another suggested concern over granting foreign patent rights to AEC contractors is that the patents may not be available for use by all industry. The comments made previously under "Contract Policy", noting the present economic situation of the industry, and the need for stimulation of private effort, are again invited to attention. In addition to these considerations, there are still further compelling reasons for granting foreign patent rights to Commission contractors.

Foreign patents are very costly to obtain, and once granted, working fees and taxes must be paid to the foreign government, usually in increasing amounts over the life of the patent. Taxes may equal the initial cost of obtaining the patent. Therefore, retention of the foreign

patent by the contractor provides compensation for obtaining, maintaining and defending the patent.

Stimulation is needed for investment in areas where the risks are even greater than in the domestic market, due to innumerable economic and perhaps political complications.

The possibility of a foreign proprietary position will encourage rather than discourage foreign participation by other American firms, and will provide an additional incentive for qualified organizations to take AEC contracts. Industry normally voluntarily cross-licenses patents in its own interests, and a number of voluntary patent pools have been established, such as in the aircraft and electronics industries. In all likelihood, voluntary arrangements for cross-licensing of foreign atomic energy patents under reasonable terms will be worked out. This proposal is decidedly better than Government retention of foreign patents. With Government retention, no competitive advantage will accrue to any American firm because of the historical and practical reasons against positive use of foreign patents by Government.

In weighing the relative needs and requirements of Government and industry for foreign patents, those of industry far outweigh the small ones of Government.

Stimulation of American nuclear interests abroad consistent with diplomatic goals

A basic misconception which must be overcome is that the furtherance of American commercial interests abroad by such means as foreign patents is somehow inconsistent with the spirit of the atoms for peace program. It is felt that, on the contrary, providing incentive for investment of American capital abroad is the surest way of bringing benefits of atomic energy to foreign countries and compensating the American Nation for the public moneys and the private skills and initiative which have been devoted to the development of atomic energy.

The loss of foreign reactor markets would also adversely affect our domestic economy by decreasing manufacturing activity and employment. The Department of State has repeatedly encouraged foreign investment in other fields as a way of furthering our diplomatic goals and this policy is perfectly applicable in the atomic energy field.

Recommendation

It is recommended that the Government accept a positive responsibility for furthering American nuclear interests abroad. This would change the present contractual policy with regard to patents, to permit the developing contractors to obtain foreign patents, it being understood that the Government will retain a license in any such patents for governmental and mutual defense purposes.

Such policy would stimulate the entry of American industry into the foreign atomic energy market, enhance U.S. world prestige and and influence and bring the benefits of atomic energy to foreign peoples most rapidly in the spirit of the atoms-for-peace program.

It would put an end to the present hazard that American inventions may be usurped by foreign nationals. The resulting increased domestic manufacturing activity will be beneficial to our economy and serve as

additional compensation for the financial and technical contributions the American people have made to atomic energy.

ATOMIC INDUSTRIAL FORUM, INC.,
New York, N.Y., April 15, 1958.

Mr. EDWARD DIAMOND,
Associate General Counsel,
U.S. Atomic Energy Commission,
Washington, D.C.

DEAR ED: The Committee on Patents, Copyrights, and Proprietary Information of the Atomic Industrial Forum has recently been reviewing the patent problems in the atomic field. As a result of this review, it has prepared a memorandum for circulation among members of the forum.

You have suggested that this memorandum might be useful to the Commission in its current review of the atomic patents situation and have requested that a copy be sent to you for inclusion in the record of the patent hearing. Consequently, I am enclosing one copy of it with this letter. The forum has, of course, no objection to your including this memorandum as part of the record of the patent hearing.

Very truly yours,

(Signed) Bill,

WILLIAM A. W. KREBS, Jr.,
Chairman, Committee on Legal Problems.

MEMORANDUM OF SUBCOMMITTEE ON PATENTS, COPYRIGHTS, AND PROPRIETARY INFORMATION OF THE ATOMIC INDUSTRIAL FORUM, INC.

The Forum's Subcommittee on Patents, Copyrights, and Proprietary Information, in view of the renewed interest in atomic patent problems, has considered certain segments of the AEC's patent program which, within the framework of existing law, appear deserving of examination. The subcommittee has prepared this memorandum with the hope that it will be helpful in identifying certain problems and in suggesting some possible avenues of exploration.

This memorandum is addressed to the following areas: (1) AEC standard patent clauses; (2) section 152 problems; (3) foreign patent rights; and (4) rights to background technology.

1. *AEC standard patent clauses.*—The standard patent clauses presently used by the AEC in its contracts and subcontracts reflect patent policies which were developed during the war and carried on after the passage of the Atomic Energy Act of 1946. These policies, which are relatively restrictive in comparison with governmental practices generally with respect to the rights granted to contractors, were developed at a time when the atomic energy program was largely shrouded in secrecy and when its efforts were directed essentially toward the development and production of weapons. During this earlier period there may also have been concern that the initial participants in the program, through their access to classified technology not available to the public generally, might secure a dominant position in this new field if they were granted substantial patent rights.

With the public interest in rapid advancement of the peaceful uses of the atom, widespread participation in the field, extensive declassification, broad access to restricted data for private purposes, and ownership by the Government of substantial patent rights to basic technology, it would appear that at least some of the considerations which led to the adoption of the original policies may no longer exist. Lack of economic incentive is a principal problem facing the atomic energy industry today. A policy of allowing more substantial patent rights to be retained by AEC contractors might help to provide a greater measure of economic incentive to those already in the field, as well as to those who are undecided about entering the field. Therefore, it would seem desirable to consider whether in the atomic energy field the public interest will be better served by a patent policy permitting Commission contractors to retain substantial patent rights. For example, patent provisions along the lines of those used by the Department of Defense might be considered.

The chapter in the AEC manual dealing with patents appears to be a complete statement of the clauses which may be incorporated in AEC contracts and of the criteria determining which clause is to be used. Actual experience shows, however, that in the course of contractual negotiations substantive modifications and refinements are made in the clauses incorporated in contracts for certain materials and under certain circumstances, but no indication of this is contained in the AEC manual.

It is recognized that modifications of standard language will be necessary in individual cases because of the special circumstances of a particular case and because flexibility is required to enable these cases to be handled on an individual, negotiated basis. However, where the Commission has seen fit to allow the contract to retain greater patent rights than are called for by the AEC manual, such as in the case of fuel element manufacturers, it would seem desirable that the AEC manual describe what the criteria are and what rights will be granted. Such an approach would not only provide to all concerned a more complete and accurate picture of the Commission's patent policies but would also help to assure comparable treatment of contractors similarly situated and would reduce the number of cases requiring individual negotiation.

2. *Section 152 problems.*—The sweeping language of section 152 of the 1954 Atomic Energy Act, under which any atomic energy inventions "made or conceived under any contract, subcontract, arrangement, or other relationship with the Commission, regardless of whether the contract or arrangement involved the expenditure of funds by the Commission, shall be deemed to have been made by the Commission" has created much uncertainty about the scope of the section, particularly the phrase "arrangement or other relationship with the Commission." However, section 152 confers upon the Commission the power to waive its claim to any such inventions. As of the present time, the Commission has made very limited use of this waiver power, at least as far as waivers in advance are concerned. It would appear that there are other areas, in addition to those in which the Commission has acted, which are deserving of careful examination by the Commission for possible exercise of its waiver power. For example, it seems reasonable that the Commission be prepared to rely on the terms of its contracts or subcontracts

to define the patent rights of the parties rather than relying on section 152. Increased use of the advance waiver power by the Commission might be helpful in minimizing the difficulties resulting from section 152 and in providing valuable guidance.

3. *Foreign patent rights.*—The policies adopted by the AEC in the complex field of foreign patents take on special significance in the light of the fact that, in the immediately foreseeable future, foreign markets may hold greater promise for certain atomic energy products than do domestic markets. At the same time the problems encountered in this field have many ramifications because of the interrelations between foreign patents and U.S. foreign policy. This field is therefore deserving of careful appraisal to ascertain what steps can be taken, consistent with major U.S. foreign policy objectives, to enable the U.S. atomic energy industry to compete successfully for foreign markets.

Atomic energy patents are expected to be an important element in the ability of American equipment manufacturers to compete in some foreign countries. In some countries possession of an extensive portfolio of patents by foreign governments and firms may seriously hamper American competition. Increased filing by the AEC in foreign countries, or prompt publication by the AEC in many instances, would appear to be one method of helping to prevent the erection of patent barriers against the participation of U.S. manufacturers in foreign markets, at least with respect to patent barriers based on U.S. developed technology. American companies which have made inventions under AEC contracts have indicated reluctance to assume the financial burdens of foreign filings because current AEC policies grant them only a nonexclusive license to patents in the atomic energy field. They apparently consider this defensive protection to be insufficient to justify the financial expense involved, particularly when in many cases an equivalent position can be obtained more rapidly and more simply by publication.

Even if some defensive protection is obtained either by publication or by increased AEC foreign filings, there would still remain an unresolved obstacle to successful participation by American industry in foreign atomic energy programs. The rights which flow from ownership of foreign patents based on U.S. technology are expected to be of considerable importance in obtaining foreign markets. Such patent rights would also provide increased opportunities for licensing, negotiation, and cooperative arrangements. Accordingly, it would appear desirable for the AEC and interested members of the atomic industry to reexamine the considerations upon which present practices in the foreign patent field are based and consider whether the national interests of the United States would be better served by allowing its contractors to retain more extensive patent rights in the foreign field.

4. *Rights to background technology.*—Another area which gives rise to numerous problems and which deserves examination by the Commission is that of dealing with rights to background technology, whether patented or not. The standard contract clause dealing with background rights grants to the Commission broad rights to patents and technical data which were not developed under the contract. Background technology is an important part of a contractor's competitive position. Further consideration might well be given by the Commission and the atomic industry to the protection of contractors'

background technology to the maximum extent consistent with meeting the Commission's real needs and public interest responsibilities in each instance.

The subcommittee recognizes that the problems which exist in the atomic energy patent field, some of which have been touched on in this memorandum, are numerous and by no means easy. The Commission's current reappraisal of its patent program and its request for widespread public comment are commendable steps in the right direction and are deserving of every assistance and encouragement.

CHAPTER VII. PATENT POLICIES OF OTHER FEDERAL AGENCIES

1947 REPORT OF THE ATTORNEY GENERAL TO THE PRESIDENT

PATENT POLICIES AND PRACTICES OF GOVERNMENT DEPARTMENTS AND AGENCIES RELATING TO INVENTIONS OF THEIR EMPLOYEES AND CONTRACTORS

I have the honor to submit my FINAL REPORT of the investigation which the Department of Justice undertook at the request of President Franklin Delano Roosevelt in 1943, dealing with the patent policies and practices of the several departments and agencies of the Government concerning inventions made by their employees and contractors.

This Final Report consists of the REPORT PROPER and 19 separate MONOGRAPHS. The Report Proper summarizes past and current practices, presents my findings and conclusions, and submits my recommendations for a uniform patent policy for the Government of the United States. The Monographs incorporate or summarize the vast body of data collected in the course of the investigation, and consist of a Monograph on the relevant principles of law; a Monograph describing prior studies of this and related subjects during the last fifty years; 14 Monographs on the patent policies and practices of each Federal department and agency which is concerned with the instant problem; a Monograph on the governmental patent practices of the 10 most industrialized foreign countries; a Monograph on the patent practices of more than 50 educational and nonprofit organizations in the United States; and a Monograph on the patent practices of the leading industrial laboratories in the United States. The Report Proper is contained in Volume I of this Study, while the Monographs are incorporated in Volumes II and III.

The size of this Final Report calls for handy summaries. Each of the 17 Monographs dealing with the patent practices and policies of governmental and nongovernmental organizations therefore contains a summary of its contents. There follows a summary of the Report Proper, briefly describing my findings, conclusions and recommendations.

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS OF THE ATTORNEY GENERAL

I. Patent Aspects of Government Research

The research and development activities of the Government have mirrored our national history, concentrating on military science in revolutionary times, expanding to meet the needs of agriculture, public health and other fields in the nineteenth century, and sky-rocketing during the past five years into a multi-billion dollar program concerned primarily with aviation, transportation, communications, ordnance and atomic energy. Federal participation in postwar research will be large and of major significance. The fruits of this great national resource are advances in science and technology, usually susceptible of civilian as well as governmental uses; and since many of these advances consist of patentable inventions, their use and enjoyment by the Government and by the people of the United States may depend upon the control of patent rights.

This Study has sought the answer to the following inquiry: What disposition of patent rights as between the Government, its employee or contractor, and what use of patent rights owned by the Government, will best serve the public welfare and stimulate the progress of science and the useful arts?

II. Inventions Made By Government Employees

A. FINDINGS AND CONCLUSIONS OF ATTORNEY GENERAL

Inventions financed with public funds should inure to the benefi of the public, and should not become a purely private monopol under which the public may be charged for, or even denied, the us of technology which it has financed. The weight of informed opinio and the evidence of experience establish that the ownership of pate rights is not a necessary form of incentive to the great majority o Government scientists and technicians. Such opinion and experience further establish that patent rights are in fact an undesirable form of incentive because they may induce lack of cooperation and secretiveness among research workers; may unduly emphasize the patentable phases of their work; would provide an unequal form of reward for performance of comparable merit and usefulness; and would permit public-financed technology to be suppressed, used restrictively, or made the basis of an exaction from the public to serve private interests.

B. RECOMMENDATIONS OF ATTORNEY GENERAL

1. The Government should obtain all rights to inventions made by its employees (i) during working hours, or (ii) with a substantial contribution by the Government (in the form of facilities, equipment, materials, funds or information, time paid for by the Government, or services of other Government personnel), or (iii) bearing a direct relation to the employee's official functions.

2. In other cases, where there is some contribution by the Government, or some relationship between the invention and the employee's official functions, but where these are clearly insufficient to warrant the assignment to the Government of all rights in the invention, as determined by the Government agency concerned, with the approval of the Government Patents Administrator (the head of the central agency which this Report recommends be established to administer the Government's patent policy), ownership of the invention should be left to the employee, subject to a nonexclusive, irrevocable, royalty-free license to the Government to make, have made, use and dispose of the invention, and also subject to the obligation on the part of the inventor or his assignee to exploit the invention diligently or to grant nonexclusive licenses thereunder at a reasonable royalty to all applicants.

3. In all other cases, the Federal employee should retain all rights to his inventions, subject to existing provisions of law. At the inventor's election, the Government may undertake to patent the invention free of any charge to the inventor under the Act of 1883 as amended, subject to the governmental license provided for therein.

III. Rewards to Employees

A. Findings and Conclusions of Attorney General

1. Any system of special financial rewards, promotions or salary increases to employees on account of their making a patentable invention or discovery is undesirable because, by offering a premium to the employee who produces the invention, it may induce secrecy and lack of cooperativeness on the part of research and technical employees; it will involve administrative difficulties of selecting the person to be rewarded whenever the invention was the result of group endeavor; it may create dissatisfaction among unrewarded members of a research group as well as among personnel assigned to functions not likely to produce a patentable invention; and it may lead the employee to slight or ignore such functions.

2. A general system of cash bonuses, promotions and salary increases for meritorious suggestions or ideas, regardless of whether they are patentable or not, would be free of these objections and may tend to remedy any inadequacies in the salary structure.

3. A valuable form of incentive and reward for outstanding scientific contributions and suggestions within the Government would be public, official and professional recognition of meritorious contributions.

B. Recommendations of Attorney General

1. The establishment of a system of cash bonuses, promotions and salary increases for scientific or technological suggestions or contributions should be left to the initial determination of each Federal agency, but as a matter of basic Government policy, no system should should be maintained within any agency which in terms or in practice is limited to or emphasizes the patentable invention, or which offers greater reward for an invention than for other types of scientific or technological suggestion or contribution. Any reward system should

make adequate provision for entire research groups or teams producing valuable scientific advances.

2. A system should be established, under the direction of the Government Patents Administrator, to provide for public, official and professional recognition of meritorious scientific contributions and advances by Federal employees, through the issuance of certificates of merit by the President or the head of the Federal agency, announcements to the press, articles in scientific periodicals, and other forms of recognition.

3. All Government agencies adopting a system for rewarding valuable scientific or technological suggestions and contributions should report the operations and success of the system periodically to the Government Patents Administrator, who should correlate the experience of each agency, and inform, advise, and make recommendations from time to time concerning the operation and improvement of the system.

4. A survey should be made of the Government salary scale for scientific and technical personnel, in order that such upward revisions should be made as may be warranted by the recent rise in the cost of living and other pertinent factors.

IV. Inventions Made By Government Contractors

A. FINDINGS AND CONCLUSIONS OF ATTORNEY GENERAL

1. Where patentable inventions are made in the course of performing a Government-financed contract for research and development, the public interest requires that all rights to such inventions be assigned to the Government and not left to the private ownership of the contractor. Public control will assure free and equal availability of the inventions to American industry and science; will eliminate any competitive advantage to the contractor chosen to perform the research work; will avoid undue concentration of economic power in the hands of a few large corporations; will tend to increase and diversify available research facilities within the United States to the advantage of the Government and of the national economy; and will thus strengthen our American system of free, competitive enterprise.

2. To leave patent rights to the contractor may permit the suppression of an invention paid for by the public, or the imposition of an assessment for its use by the public to serve private advantage. It would constitute an unequal form of reward for comparable performance, and would tend to unbalance Federal research by making more desirable those aspects likely to lead to commercially valuable patent rights.

3. Expert opinion and experience within and without the Government support the conclusion that a policy of public ownership of inventions made under Government contract would be acceptable to a sufficient number of competent private and institutional laboratories to make it workable. However, exceptions to the basic policy should be allowed where necessary in emergency situations, to permit the contractor to retain the patent rights to inventions to which he has already made a substantial independent contribution; but in all such cases the Government should obtain at least a free license under the

resulting inventions and should prohibit their suppression or the assessment of unreasonable charges for their use by others.

4. The weight of evidence is that the policy recommended herein will not substantially increase the costs of Government research contracts, nor diminish the efforts of the contractor's organization to perform the work competently. To the extent that extra costs may result from the recommended policy, they would be fully justified by the advantages of making publicly-financed technology broadly and freely available.

B. RECOMMENDATIONS OF ATTORNEY GENERAL

1. As a basic policy, all contracts for research and development work financed with Federal funds should contain a stipulation providing that the Government shall be entitled to all rights to inventions produced in the performance of the contract.

2. If the head of any Government agency certifies, with the approval of the Government Patents Administrator, that an emergency situation exists requiring that an exception be made to the basic policy in a particular case in respect of prospective inventions to which the contractor has made a substantial independent contribution prior to the award of the contract, such exception may be made, upon such terms and conditions as the Administrator may prescribe or approve. Every such exception should, to the extent possible, be subject to the following conditions:

(*a*) The head of the agency concerned should certify, with the approval of the Government Patents Administrator, that he has made a reasonable effort to enter into a contract for the research or development work in question with a qualified organization in accordance with the Government's basic patent policy, but has been unsuccessful.

(*b*) The contract as awarded should stipulate that the contractor will be permitted to retain patent rights only to inventions which involve a substantial independent contribution by the contractor or his staff antedating the work called for in the contract, as determined by the head of the agency with the approval of the Government Patents Administrator, or, in appropriate cases, by arbitration.

(*c*) The contractor should grant the United States a nonexclusive, irrevocable, royalty-free license, to make, have made, use and dispose of any inventions awarded to him under the contract.

(*d*) The contractor (or his assignee) should agree to place the invention in adequate commercial use within a designated period; and if at the end of such time the Government determines that such use is not being made, the contractor (or his assigneee) should be required to offer nonexclusive licenses at a reasonable royalty to all applicants.

3. Cooperative research projects shall also be subject to the basic patent policy, but the head of the agency concerned, with the approval of the Government Patents Administrator, may make an exception to this policy in a particular case when a proper showing of the need therefor has been made; provided, however, that the conditions of section 2 above shall be observed to the extent feasible.

4. To the extent permitted by law, grants of Federal funds for research or development work which may result in patentable inventions should be subject to the same patent policy as pertains to research and development contracts.

V. Administration of Government-Owned Patent Rights

A. Findings and Conclusions of Attorney General

1. The public interest will best be served by opening Government-owned inventions to general public use, without discrimination or favoritism among users.

2. While opinions vary, the weight of experience is that Government-owned technology can for the most part be exploited to a satisfactory extent under a system of nonexclusive licensing or public dedication. In the occasional situation where the commercial use and exploitation of worth-while inventions is discouraged by the need for a substantial investment in promotional, developmental and experimental work, with the attendant risk of loss, the Government should finance such operations, in whole or in part, to demonstrate or prove the commercial value of the invention. This method of encouraging the use of the invention is preferable to the grant of an exclusive license.

3. The issuance of exclusive licenses under Government-owned inventions presents the difficulties of selecting one out of numerous applicants (for which purpose competitive bidding is undesirable and unsuited), policing the licensee's operations, and detecting and prosecuting infringers. The outright sale of an invention would deprive the Government of control over its use, and would permit its suppression or the exaction of an unreasonable charge for its use by the public. Moreover, the price received by the Government for the invention is apt to be far less than the ultimate cost to the public of using it.

4. As a general rule, the licensing of Government inventions on a royalty basis is objectionable because it may be difficult to fix a royalty which will be fair to all; it will necessitate detecting and prosecuting infringers; and it involves the imposition upon the public of a charge for the use of technology paid for with public funds. The financing of research by general taxation appears to be a simpler and more equitable method.

5. The licensing of Government inventions under conditions relating to the use of the invention or its resulting product is likewise objectionable as a general rule, because it will require policing of the licensee's operations, and the detecting and prosecution of infringers. Control over the use of the invention or its product may more effectively be imposed by other means.

6. Patenting of Government inventions affords greater protection than publication of the unpatented invention, and permits controls to be imposed in appropriate cases upon the use of the invention.

B. Recommendations of Attorney General

1. As a basic policy all Government-owned inventions should be made fully, freely and unconditionally available to the public without charge, by public dedication or by royalty-free, nonexclusive licensing.

2. As soon as an invention is completed under circumstances giving the United States the right to any patent rights therein, it should be covered by a patent application, unless the head of the agency finds that adequate protection of the public interest may be had by reducing the invention to practice, publishing it, and fully disclosing

it to the Patent Office in such form as to make it a part of the prior art.

3. All inventions and patent rights now owned or controlled, or hereafter acquired, by the United States or any agency thereof, corporate or otherwise, should be listed in the register of Government patent rights in the United States Patent Office, and copies or abstracts thereof should be freely distributed to Government agencies, public libraries, universities, trade associations, scientists, industrial and commercial organizations, and other interested groups and persons.

4. To the extent that funds are or may be made available for the purpose, projects should be inaugurated by the interested Government agencies under the supervision of the Government Patents Administrator, to demonstrate and publicize promising inventions at key industrial and scientific centers, in order to inform and interest business and science, and particularly small business, in their use or development and to eliminate any obstacles to their successful exploitation. Similar publicity should be given to scientific and technical information of an unpatentable nature, acquired by the Government.

5. If the Government Patents Administrator or any other Government agency believes that the commercial use and exploitation of a promising invention would be aided by preliminary experimental, developmental or pilot-plant operations to establish its practicality or effectiveness, the Government Patents Administrator may recommend such projects to the appropriate Government agency or to Congress for adoption.

6. The Government Patents Administrator should prepare and submit to the President for approval a program to encourage and sponsor the use and practice of Government-owned inventions by small and new business concerns, and should report periodically on the extent of use of Government-owned inventions.

VI. Foreign Rights

Under every invention in which the Government acquires a free, nonexclusive license in the United States, it should also acquire a similar license operative in foreign countries.

Under every invention to which the Government acquires title in the United States, it should also acquire the right to control the ownership, use and disposition of the foreign patent rights therein.

If in respect of any invention acquired by the United States, the head of the agency and the Government Patents Administrator find that control over the foreign rights is not necessary or desirable in the public interest, such rights may be released to the employee or contractor involved, subject to any terms or conditions deemed proper in the public interest.

VII. Secrecy

Employees and contractors of the Government should be required to agree, in respect of any inventions made by them which the Government determines should be kept secret, that they will not disclose the invention to any unauthorized person, or assign any rights therein, or file any domestic or foreign patent applications, unless and until authorized to do so by the Government.

VIII. Uniform Policy and Procedure

A. FINDINGS AND CONCLUSIONS OF ATTORNEY GENERAL

1. President Roosevelt's letter inaugurating this Study noted the "need for a uniform Government-wide policy with respect to the ownership, use or control of inventions made by employees of the Federal Government, or by employees of Government contractors in the course of performing contracts financed by the United States," and this investigation has fully demonstrated the soundness of that observation. A uniform policy will extend to all Federal agencies the benefits of sound patent principles, will avoid competition among the agencies, and will strengthen the Government's bargaining position. Exceptions to the basic policy, where these prove desirable, should also be governed by uniform principles centrally administered, to avoid conflict and a possible breakdown of the policy itself.

2. The patent policy recommended above, since it has to do with employment and contracting within the executive branch, may be prescribed by executive order and implemented by departmental regulations. It does not affect the existing patent laws or the present patent system in any respect.

B. RECOMMENDATIONS OF ATTORNEY GENERAL

1. A Government Patents Administration should be established by the President, headed by a Government Patents Administrator to be appointed by the President, and assisted and advised by an Advisory Patents Board consisting of representatives of Government, industry, labor, education, and the consuming public. The Government representatives should consist of one person from each of the following Government agencies: Departments of Agriculture, Commerce, Interior, Justice, Navy and War; Federal Security Agency; Federal Works Agency; National Academy of Sciences; National Advisory Committee for Aeronautics; Office of Scientific Research and Development, or its successor; Reconstruction Finance Corporation; and Tennessee Valley Authority, designated by the head of the agency. The other representatives should be designated by the President.

2. The Government Patents Administrator, assisted by the Patents Advisory Board, should be charged with the functions of administering, interpreting, and enforcing the uniform patent policy to be established by the President, and determining and settling any controversies arising thereunder.

CHAPTER ONE

THE PATENT ASPECTS OF GOVERNMENT RESEARCH

Scientific and technological research conducted or financed by the United States represents a vast national resource, rivalling in actual and potential value the public domain opened to settlement in the last century. Because the control of patent rights in inventions resulting from such activities means the control of the fruits of this resource, it is important to determine upon a policy for the Government which will best serve the public interest, further the progress of science and the useful arts, and spread the benefits of the scientific advances as widely as possible.

I. Government Research

The activities of the United States Government in the field of scientific and technological research and development almost mirror our national history and economic progress. The earliest research undertaken by the Federal Government, shortly after the Revolutionary War, was in the field of military science, which continued to be emphasized during the early decades of our history. The emphasis gradually shifted to agrarian technology, and with the opening and development of our continent during the second half of the nineteenth century, the Government's scientific exploration expanded considerably to meet public needs in the domain of agriculture, public health and other fields. Until the beginning of the second World War, the major part of Government research and development was still devoted to agriculture and the development of land resources. The requirements of modern warfare then led scientific inquiry into such fields as aviation, ordnance, atomic energy, communications and shipping, which have accounted for more than three-fourths of the two billion dollars expended on Federal research during the five-year period 1940–1945. The war emergency also led to a great expansion in the technological equipment of the country, largely with Federal funds. To meet the unprecedented demands of World War II, existing Government research facilities were expanded, new plants and laboratories were constructed and equipped, and the full scientific resources of the country, including industrial and institutional as well as Government laboratories, were mobilized under Federal direction.

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The increase in Federal research expenditures during the past quarter century has been spectacular. From an annual research budget of about $20,000,000 in 1920 and $50,000,000 in 1938, the Government's expenditures for scientific research leaped to over $700,000,000 in 1944, exclusive of its activities in the field of atomic energy. The latter phase of wartime research added about $200,000,000 to the budget for pure research activities, and about 2 billion dollars if there is taken into account the cost of the pilot plants, manufacturing facilities and other equipment necessary for the production of the first atom bomb. Whereas before the war private industry financed about two-thirds of the Nation's research, with about one-sixth coming from Government and one-sixth from universities and research foundations, by the end of the fiscal year 1944 the Government was financing more than three-quarters of all research, the total annual expenditure of which was at least doubled. During 1944, a year representative of the war period, the research functions of the Government engaged some 36,000 civilian employees, of whom at least 20,000 were scientists and technicians. In that year about $500,000,000 in Federal funds (some 70% of the total research expenditures) was paid to outside organizations, most of it for research relating to aircraft, automotive transportation, communications and synthetic rubber.

More than a dozen Federal departments and agencies regularly conduct or finance an appreciable amount of research and development work in science and technology as a part of their normal functions. The most important agencies in this respect are the Departments of War, Navy, Agriculture, Interior, and Commerce, and the National Advisory Committee for Aeronautics. During the recent war, temporary agencies such as the Office of Scientific Research and Development and the wartime subsidiaries of Reconstruction Finance Corporation also sponsored considerable research in significant fields.

The Nation's facilities for technological and scientific development (governmental, institutional and private), and the technical skill and learning available among our population, constitute one of our most valuable national resources. Congress has in fact displayed a considerable interest in this giant force which possesses such tremendous potentialities to serve the public weal, and bills have been introduced which would give direction and stimulation to national research and supply generous grants of public funds to aid it. This legislation, exemplified by the Kilgore and Magnuson bills, would establish a National Science Foundation to finance research at industrial, educational, nonprofit and governmental laboratories, by means of contracts, loans and grants. The hearings on these measures during October 1945

before the Subcommittee on War Mobilization of the Senate Committee on Military Affairs, at which leading scientists, business leaders, and Government officials endorsed the program, presage an important role by the Federal government in a greatly expanded postwar program of scientific research and development.

Indeed, the nature of our modern industrial economy, and the marked acceleration of scientific advance in many fields during World War II, would seem to make inevitable a substantial participation by the Government in postwar research. The dramatic developments in the fields of radar, jet propulsion, rocket missiles and the atomic bomb have brought forcibly to our attention the significance of science and technology in modern war; but most of these developments have great peacetime potentialities as well. The overwhelming need for medical research to aid in establishing a higher norm of physical well-being in our country was sharply emphasized by the disconcerting results of the physical tests made in connection with Army admissions. And the forces which modern science can muster to meet those needs are exemplified by the wartime development of such products as the sulfa drugs, penicillin and DDT.

One lesson repeats itself in this recital of scientific strides during World War II: that the greatest advancements in the field of science will be encouraged and expedited if active participation and financial aid are supplied by the Government. This is particularly true in the field of basic scientific research, which was relatively neglected during the war years when emphasis was necessarily placed upon applied research. The technological problems posed by our present civilization are of such magnitude, and the need for their solution so urgent, that only by the pooling of resources and information on a nation-wide scale can the challenge adequately be met. The cost of the experiments and the developments; the knowledge, experience and information that must be accumulated and correlated; and the financial risks involved, are such that private industry, necessarily gauging its activities by the possibility of profit and the risk of loss, would in all likelihood be unable to carry the burden by itself. Consequently, the Government must perform or underwrite the research in whole or in part, if the advantages of a concentrated attack upon the most vital problems are to be had. Legislation such as the Kilgore bill recognizes this truism and proposes to accomplish the desired objectives by a partnership arrangement between Government and private organizations, whereby the Government furnishes the funds and collects and disseminates information, and the private organizations actually carry out the research.

Whether or not this proves to be the pattern of postwar research, Federal contribution and participation on a large scale seem certain. For the fiscal year ending June 30, 1947, about $700,000,000 was appropriated for scientific research and development by the several Government agencies, excluding research on atomic energy. To this should be added some $800,000,000 available on July 1, 1946 as unliquidated

obligations from prior fiscal years, making a total of one and a half billion dollars, available for such research.

Moreover, these activities will be carried on in the most modern manner and with the best available facilities. The Government's research program has called upon and will continue to utilize the great private and institutional laboratories to an ever increasing degree, and in common with these organizations, the Government's own research facilities involve, not the solitary inventor, but corps of professionals—engineers, physicists, chemists, mechanics—organized and centrally directed research teams engaged in cooperative attacks upon major problems.

II. Patent Problems Posed By Government-Financed Research

Scientific research is one of our great national resources; and advances in scientific and technological knowledge are its fruits. Since many of the discoveries and developments produced in the course of Government-financed research will be of a patentable nature, their use and enjoyment will depend upon the control of the patent rights.

Patent rights have a triple significance to the Government. (1) They have an "immunity value," as a means of reducing or eliminating the costs to the United States of making or using inventions in connection with Government production or procurement. This aspect of the patent may be its most valuable feature, if the invention is useful principally or entirely to the Government; but such a situation is becoming progressively rarer as science continues to multiply the potential uses of every important discovery. (2) Patents have a "pecuniary value," as an item of property which can be sold, licensed at a royalty, or used to acquire rights in other patents (for example, through cross-licensing). (3) Patents have an "exclusionary value" —the power to exclude others from the use of the invention or to permit use upon stipulated conditions. This power is of great significance.

The "exclusionary" aspect of the patent is the source of the so-called "commercial rights" in the patent, since it enables the owner to exploit the invention, or to suppress the invention in favor of existing processes and technology, behind the protective monopoly of the patent, or to exercise some control over the activities of others by licensing the invention upon conditions to the extent permitted by law. In the hands of the Government, the patent possesses a unique, if somewhat negative "exclusionary" significance, since it deprives private persons of any power to exclude or limit the use of the invention.

These attributes of a patent acquire added importance when they relate to technological improvements which have both wartime importance and valuable potentialities for peacetime use, such as atomic

energy, radar, synthetic rubber, synthetic medicines, plastics, and jet propulsion.

This Report is concerned primarily with the control, disposition and use of patent rights in inventions resulting from research conducted or financed by the Government, and with the formulation of a policy for such inventions that will best serve the public interest, further the progress of science and bring about the most widespread enjoyment of its benefits. The inquiry is pertinent to the several thousand patents and patent applications which the United States already owns or controls, mainly as a result of Government-financed research; and to the additional thousands under which it possesses a license. But chiefly it concerns the inventions and discoveries that will be produced each year in the course of Federal research activities—functions which may be expected to continue on a scale surpassing all prior peacetime operations.

More particularly, this study has sought answers to the following problems relating to inventions made by a Government employee, a Government contractor, or some other recipient of Federal funds or facilities, and to patent rights otherwise acquired by the United States:

1. Who should own or control the invention: The employee, the contractor, the grantee, the Government?

2. What rights, if any, should the others have therein? Should foreign patent rights be treated differently than domestic patent rights?

3. If the employee, the contractor or the grantee is given ownership, what controls or conditions, if any, should be imposed by the Government as to the use of the invention?

4. If the Government is given ownership, should the invention be dedicated to the public, and if so, should it first be patented?

5. If the invention is patented by the Government and is to be licensed, what provisions should be made in respect of (*a*) exclusiveness or nonexclusiveness; (*b*) royalties; (*c*) the manufacture, use or sale of the invention, or the making of further patentable improvements therein by the licensee?

6. Should Government-owned patents be sold, and if so, under what terms and conditions, if any?

7. Apart from any rights in his invention, should the Government employee be given a special reward on account of the invention, such as a cash bonus, participation in the commercial proceeds, if any, salary increase, promotion, public recognition?

8. What procedures, if any, should be adopted to apprise science, industry, and the general public of the results of Government-sponsored research; to notify the public and the several Governmental agencies of technological advances and discoveries available for use under license or otherwise; and to finance or otherwise aid in the solu-

tion of experimental or developmental work necessary for commercial exploitation of the invention?

9. To what extent should a uniform policy be adopted for the entire Government?

10. If a uniform policy is adopted, how shall it be administered, and what provision, if any, should be made for exceptions?

III. Objectives Of A Sound Policy

There can be little disagreement as to the principal aims of a sound policy relating to inventions in which the Federal Government has an interest. The best policy would satisfy the following four criteria:

1. The policy should serve the public welfare, which can be postulated to involve the most widespread use of the invention in the interests of the health, safety and prosperity of the Nation.

2. The policy should not discourage the making of new inventions, but on the contrary should stimulate the progress of science and the useful arts.

3. The policy should be consistent with our American system of free competitive enterprise.

4. The policy should meet the full needs of the Government, both in normal times and in periods of emergency, and should not interfere with the functions or objectives of the individual Government agencies.

To the extent that all of these criteria cannot be met simultaneously, it must be decided which factor or factors should be subordinated, and in what circumstances.

CHAPTER TWO

INVENTIONS MADE BY THE GOVERNMENT EMPLOYEE

Recommendations of Attorney General: (1) The Government should obtain all rights to inventions made by its employees (i) during working hours; or (ii) with a substantial contribution by the Government in the form of facilities, equipment, materials, funds, information, time, or services; or (iii) bearing a direct relation to the employee's official functions (2) In other cases, where there is some Government contribution, or some relationship between the invention and the employee's official functions, but where these are clearly insufficient to warrant assignment to the Government of all rights to the invention, as determined by the Government agency concerned, with the approval of the Government Patents Administrator, ownership of the invention should be left to the employee, subject to a nonexclusive, irrevocable, royalty-free license to the Government, and also subject to the obligation on the part of the employee or his assignee to make the invention available to the public on reasonable terms. (3) In all other cases, the employee should retain all rights to the invention, subject to existing provisions of law.

The two chief sources of Government patent rights in normal times are inventions made by Government employees, and those made by Government contractors. The circumstances under which the Federal employee may make an invention are susceptible of infinite diversity, involving such variables as the relationship between the invention and the inventor's official functions or assignment of duties; the extent to which the inventor's superiors contemplated or anticipated the invention; and the extent of the Government's contribution in the form of time, facilities, equipment, materials, funds, services of other employees, or information.

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III. Findings and Conclusions of Attorney General

Inventions financed with public funds should inure to the benefit of the public, and should not become a purely private monopoly under which public-financed technology may be suppressed, used restrictively, or made the basis of an exaction from the public to serve private interests. The weight of informed opinion and the evidence of experience establish that the ownership of patent rights is not a necessary form of incentive to the great majority

of Government scientists and technicians. Such opinion and experience further establish that patent rights are in fact an undesirable form of incentive because they may induce lack of cooperation and secretiveness among research workers; may unduly emphasize the patentable phases of their work; and would provide an unequal form of reward for performance of comparable merit and usefulness.

Upon careful consideration of the data contained in the Monographs, and for the reasons more fully developed herein, I conclude that the public welfare, the needs of the Government, and the best interests of Federal employees themselves, will best be served by the establishment of a uniform policy, applicable throughout the Government, whereby the United States would be entitled to the ownership and control of the patent rights to inventions which, because of the Government's contribution thereto or the close relationship with the employee's official functions, can fairly be said to have been financed with public funds or to have resulted from an operation of Government. This conclusion is based upon the following findings of fact:

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CHAPTER FOUR

INVENTIONS MADE BY GOVERNMENT CONTRACTORS

Recommendations of Attorney General: 1. As a basic policy, all contracts for research and development work financed with Federal funds should contain a stipulation providing that the Government shall be entitled to all rights to inventions produced in the performance of the contract.

2. If the head of any Government agency certifies, with the approval of the Government Patents Administrator, that an emergency situation exists requiring that an exception be made to the basic policy in a particular case in respect of prospective inventions to which the contractor has made a substantial independent contribution prior to the award of the contract, such exception may be made, upon such terms and conditions as the Administrator may prescribe or approve. Every such exception should, to the extent possible, be subject to the following conditions:

(a) The head of the agency concerned should certify, with the approval of the Government Patents Administrator, that he has made a reasonable effort to enter into a contract for the research or development work in question with a qualified organization in accordance with the Government's basic patent policy, but has been unsuccessful.

(b) The contract as awarded should stipulate that the contractor will be permitted to retain patent rights only to inventions which involve a substantial independent contribution by the contractor or his staff antedating the work called for in the contract, as determined by the head of the agency with the approval of the Government Patents Administrator, or, in appropriate cases, by arbitration.

(c) The contractor should grant the United States a nonexclusive, irrevocable, royalty-free license, to make, have made, use and dispose of any inventions awarded to him under the contract.

(d) The contractor (or his assignee) should agree to place the invention in adequate commercial use within a designated period; and if at the end of such time the Government determines that such use is not being made, the contractor (or his assignee) shall be required to offer nonexclusive licenses at a reasonable royalty to all applicants.

3. Cooperative research projects shall also be subject to the basic patent policy, but the head of the agency concerned, with the approval of the Government Patents Administrator, may make an exception to this policy in a particular case when a proper showing of the need therefor has been made; provided, however, that the conditions of section 2 above shall be observed to the extent feasible.

4. To the extent permitted by law, grants of Federal funds for research or development work which may result in patentable inventions should be subject to the same patent policy as pertains to research and development contracts.

A very substantial part of the Government's research and development activities is carried on by independent persons or organizations under a contract or other arrangement with the United States, financed in whole or in part with Federal funds. The most common arrangement is a contract between the Government agency and the company or organization, whereby the latter undertakes to conduct specified research or development for a consideration stipulated in the contract. The majority of such contracts, in dollar amount, is made with private laboratories, generally an adjunct of an industrial or commercial concern. A substantial percentage, however, is made with universities and other educational institutions; a few are made with nonprofit organizations; and in rare cases with individuals.

The consideration frequently takes the form of stipulated payments by the United States to the contractor; but in many cases, and perhaps in the majority of instances during World War II, the Government undertook to pay the actual costs of the research (including overhead), an additional percentage of costs often being added as a profit. The contracts, especially those awarded during recent years, usually make some provision for the disposition of patent rights in inventions resulting from the performance of the stipulated work.

A related category of Government-sponsored research comprises the grant-in-aid to public bodies or institutions to finance scientific research and development. Such expenditures of Federal funds may be unaccompanied by any supervision or control over the use of the funds, as where the grant is directed by statute to be made to a specified class of recipients. In some cases, however, the granting agency may affix conditions to the grant, such as the requirement that it be used within a designated field or for specific purposes. When the terms and conditions governing the expenditure of a Federal grant for research and development become sufficiently concrete and are embodied in an agreement or other formal understanding, the arrangement becomes equivalent to the usual research contract. The discussion of research contracts herein will therefore include the latter type of grant.

Under either the research contract or the Federal grant, the Government's contribution may take a form other than or in addition to a monetary consideration, such as furnishing plant facilities or the services of Government personnel.

I. The Law

Since the relationship between the Government and the contractor arises from an agreement between them, their rights and obligations depend essentially upon the terms of the agreement and the inferences to be drawn therefrom. The contract may explicitly dispose of rights to inventions made in the course of performance, either *in toto* to one of the parties or in part to each. For example, the Government may expressly obtain the right to an assignment of all patent rights, or may reserve only a nonexclusive license leaving the patents to the contractor; or the parties may agree that the resulting inventions should be dedicated to the public. The courts will respect and enforce any disposition thus agreed to so long as no statute or other dominant rule of law stands in the way.

Because research and development contracts during the past 15 years have usually contained express provision for the disposition of patent rights or, where such provisions were omitted, few problems of allocation of inventions appear to have been litigated, the case law has been meager as to the respective rights of the parties where the contract is silent on this score. The infrequent instances of Government research contracts which are silent on the question of patent rights today render the problem of minor current importance. From the available materials, however, there is discernible a judicial tendency in such cases to apply the principles relating to inventions made by an employee. Hence, an invention made under a research contract which requires the contractor to develop an improvement of that kind would probably be awarded to the party paying for the work; whereas, if the invention was not contemplated by the contract but involved the use of funds made available under the contract, the party supplying the funds would be entitled to a free license, on the analogy of the employer's shop right.

Under our law, a patentable invention can be made only by an individual or by several individuals working jointly. Since the Government contractor is usually a corporation or an institution, the latter's agreement to make some or all of the patent rights available to the Government requires a corresponding obligation on the part of the contractor's employees who engage in performing the research contract. Such an obligation is as a general rule imposed expressly by the employment contract.

II. The Practice

The Government research and development contract has been known for many years, but its use on a substantial scale was not begun until after World War I. At first, the contracts were silent as to the disposition of patent rights in inventions made in the course of performing the contract, and the result was a number of controversies with the contractors, not only as to ownership of the resulting inventions but also as to whether the Government even had a license thereunder. The only judicial decision on the question settled the issue in the affirmative in 1929 upon the analogy of the common law principles applicable to the employer-employee relationship.

During and subsequent to World War I, the War and Navy Departments began to include patent provisions in their research and development contracts, and this has now become the general practice.

A. WITHIN THE GOVERNMENT

There is considerable diversity of practice among the several Government agencies as regards the patent rights to inventions made under their research contracts. Some agencies generally retain a substantial degree of control over the patent rights. Examples are the

Department of Agriculture, the Tennessee Valley Authority, the Rubber Reserve Company, and Defense Plant Corporation. Other agencies have made a substantial use of both an "assignment" and a "license" clause. Principal examples are the Office of Scientific Research and Development, the National Advisory Committee for Aeronautics, and the Quartermaster Corps of the War Department (during World War II). Still a third group generally leaves the patent rights to the contractor subject to a free Government license. These are principally the War Department (except as indicated), the Navy Department, and the War Production Board.

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A. THE PUBLIC INTEREST WILL BEST BE SERVED BY GOVERNMENT CONTROL OF INVENTIONS MADE UNDER GOVERNMENT CONTRACTS

In discussing the Federal employee, the conclusion was reached that the public interest would be better served by governmental rather than private control of technology financed with public funds (pp. 29–38). Suspending for the moment the question of acceptability of the terms to the contractor, all the considerations leading to that conclusion in the case of inventions made by Federal employees are equally pertinent when the instrumentality used by the Government is an independent contractor rather than an agent.

1. *Public versus Private Benefit*

Inventions made under a Government contract are the product of expenditures from the public treasury in the course of a governmental function; the public, having in a sense ordered and paid for the invention through its representatives, should not again be taxed for its use, nor excluded from its use, nor permitted to use it upon restrictive conditions advantageous to no one but the patent owner. There is no obligation on the part of the contractor to exploit the patent or to make the invention available for use by others; he may well suppress the invention if this would best serve his economic interests, with the result that technological improvements financed with public funds would be denied to the public to serve a private interest.

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2. *Competitive Advantage*

No one would justify the appropriation of public funds to secure a monopoly for a private organization or to strengthen the position of one concern in a competitive industry. Yet the practice of leaving to the contractor the patent rights to technology financed by the Government may have precisely that effect, particularly where the contractor is an industrial concern. The company selected to perform the contract would be given an advantage over its competitors in the form of patent rights, with the power to outstrip other members of the industry or to gain a head start in a new field.

This factor induced Rubber Reserve Company to require its research and development contractors to grant the Government the power to issue free sublicenses in the synthetic rubber field under inventions made in the course of performing the contract (a so-called "extendible immunity"). In the words of Rubber Reserve, to permit the contractor to retain full patent rights "would permit private corporations to enhance their individual patent positions in the synthetic rubber field as an incident to research paid for by the Government."

The same point was made at the hearings on a bill before the Senate Committee on Atomic Energy providing for Government control over the production and use of fissionable materials. When it was brought out by a representative of the Office of Scientific Research and Development that some private corporations to which OSRD had awarded research and development contracts in the field of atomic energy, had been granted an exclusive license under the resulting inventions, with the right to grant sublicenses, a member of the Committee expressed the opinion that this gave those corporations "an unearned privilege" from research entirely financed by the Government, and a head start at the very outset of a new age in which atomic energy might well be the dominant force.

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B. A GENERAL POLICY OF GOVERNMENT OWNERSHIP OF INVENTIONS MADE UNDER FEDERALLY-FINANCED RESEARCH AND DEVELOPMENT CONTRACTS WOULD BE ACCEPTABLE TO A SUFFICIENT NUMBER OF QUALIFIED CONTRACTORS

The principal argument advanced against a policy which would call for Government ownership of inventions made under Federal research and development contracts, is that the most competent and best equipped organizations will decline to accept Government contracts on such a basis. That is advanced principally by spokesmen for the armed services and for industry. It is urged even more vigorously by these sources (and joined in by others) as to cases where the contractor has already done considerable work and made substantial advances toward the solution of the particular problem; and they argue that such a contractor will be unwilling to accept a Government contract which, by calling for an assignment of resulting patents, in effect requires him to turn over to the Government the fruits of his earlier independent efforts.

It is my opinion that a policy of Government ownership of contractor's inventions should prove workable; that there is every reason to believe it will not prevent the Government from obtaining competent and qualified research contractors; and that where it is necessary to contract with a concern having made a substantial investment and contribution towards the solution of the same problem, an exception to the basic policy can be made, under adequate safeguards.

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CHAPTER SIX

FOREIGN RIGHTS

Recommendations of Attorney General: 1. Under every invention in which the Government acquires a free, nonexclusive license in the United States, it should also acquire a similar license operative in foreign countries.

2. Under every invention to which the Government acquires title in the United States, it should also acquire the right to control the ownership, use and disposition of the foreign patent rights therein.

3. If in respect of any invention acquired by the United States, the head of the agency and the Government Patents Administrator find that control over the foreign rights is not necessary or desirable in the public interest, such rights may be released to the employee or contractor involved, subject to any terms or conditions deemed proper in the public interest.

The foreign patent rights to inventions made by Federal employees seem to have been of merely academic interest until World War II. Up to this time, most agencies of the Government took no notice of foreign rights, and no record has been found of any attempt by the United States to obtain a foreign patent on an invention which became its property, or to interfere with the patenting of its employees' inventions in foreign countries. During and subsequent to World War II, the Office of Scientific Research and Development did file some applications abroad to protect the interests of the United States, but the primary questions which have arisen have been as to the right of the Government to use in a foreign country an invention under which the Government has obtained a license or shop right in the United States.

I. The Law

The common law principles which would entitle the United States, in certain circumstances, to the ownership of a United States patent obtained by a Federal employee would seem to cover all rights to the invention, including a foreign patent thereon. For the same reason, inventions assigned to the United States under a contract of employment or regulation would carry with them the foreign rights, unless the parties plainly intended the foreign rights to remain with the inventor. So long as the foreign law so permits, there would appear to be no reason why the United States would not obtain a patent in foreign countries on the invention which it has acquired here, assuming that the funds were available to pay the fees and expenses of patenting.

Where the United States is entitled only to a shop right or free license under an invention made by an employee, somewhat different questions arise. The shop right granted by law normally covers the free use of the invention by the employer at his plants and facilities; and there is no reason why use by Government agents at facilities in

a foreign country would not equally be covered. The applicable foreign law would determine whether a license created under the law of this country would be effective in the foreign country, although there seems to be little doubt that a written license to use the invention throughout the world would in general be recognized in other countries.

II. The Practice

The *Department of Agriculture* left all foreign rights in inventions to employees until 1943, whether or not the domestic patent rights were owned by the Government. On occasion, the employee's foreign rights were regarded as a form of compensation to the inventor, but they never proved of any appreciable value, and both the Department and its employees have shown little interest therein. However, during World War II a problem arose concerning the right of the United States or its Allies to use in a foreign country an invention made by an employee of the Department, and while officials of the Department still maintain that the employee should be permitted to keep the foreign rights as long as the Department has no funds to file abroad, they urge that the Government should reserve a free license to use the invention in any foreign country. This view resulted in a departmental regulation issued in 1943, reserving to the United States a royalty-free license in foreign countries under any invention which is owned by or licensed to the Government in this country, or dedicated to the public.

The *Interior Department* also adopted an affirmative policy concerning foreign rights in its 1942 regulations. They provide that where the Department obtains an assignment of an employee's invention, the foreign patent rights are also to be assigned if the Secretary determines that "private ownership" of such rights "would be contrary to public policy." Otherwise the employee is permitted to retain the foreign rights. The *War Production Board* had an identical provision.

The *Navy Department* has generally left foreign patent rights to the employee along with the domestic patent rights, and as late as 1943 the Judge Advocate General's Office indicated that it still had little interest in this phase of the subject. The Judge Advocate General ruled in 1922 that where the Navy is entitled to an assignment of an invention, the foreign patent rights must be included and the form of assignment prescribed by Navy regulations is sufficiently broad to include foreign as well as domestic rights under the assigned invention. There has been some question as to the scope of the license ordinarily taken by the Department and its application to lend-lease materials used abroad by our Allies.

The *Signal Corps* in the *War Department*, which during World War II obtained the assignment of a substantial number of inventions from its employees, uses a form which transfers to the Government "the entire right, title and interest *throughout the United States*" and its territories. The license clause used by the Judge Advocate Gen-

eral and by a number of the services creates rights that are effective throughout the world. Since most of the important inventions within the War Department were kept secret during the recent war, so that foreign patent applications were prohibited, the question of foreign patent rights has not arisen, except in connection with problems resulting from lend-lease use.

The *Bureau of Standards* has permitted its employees, even though under a policy of assigning all the domestic patent rights to the Government, to retain all foreign patent rights therein.

III. Opinion Within the Government

The *Department of Agriculture*, which has apparently given most thought to this matter, believes that at the present time the soundest policy is for the Government to leave commercial rights in foreign countries to the employee, subject to a free license in the United States. This position is explained as follows:

The Government should obtain a free right to use the invention in foreign countries because "the employee-inventor should not be permitted to make a profit at the expense of his employer even in a foreign country." But securing foreign patents requires payment of fees and taxes to foreign governments for which Congress has made no appropriation; and leaving the foreign commercial rights to the inventor will induce expenditures of private funds for this purpose, and thus assure the Government of a license. Presumably the Department would have no objection to retaining title abroad if the requisite funds for filing were available.

The *Interior Department's* policy, exemplified by its 1942 regulation, is apparently to permit private ownership of the foreign patent rights by its employees where considerations of public policy do not call for Government control. The Interior's regulation is silent, however, as to whether the Government would obtain a license under a foreign patent which is left to the employee.

In the infrequent instances where the question has arisen in other agencies, there seems to be agreement that the Government should have a free license under the employee's foreign patent if the invention is one which the Government has the right to use in this country.

IV. Findings and Conclusions of Attorney General

I believe that the United States should obtain a royalty-free, nonexclusive and irrevocable license to use in all foreign countries, any invention which it may use free of charge in the United States; and that where the Government obtains title to an invention, it should reserve the right to an assignment of any foreign patent thereon, subject to the retention by the inventor of such rights in the foreign patent as would not be inconsistent with the Federal interest.

A. LICENSE

All the reasons for assuring the Government of a free right to use inventions financed with Federal funds apply to the use of the invention in foreign countries. Such a right may indeed become important to the Government. Recently, the Government encountered some embarrassment because of doubt as to its right to authorize an Allied government to use, in its behalf, inventions made by Federal employees in the course of their employment. This could have been avoided if there had been a clear license to the United States to use its employee's invention in foreign countries. Consequently, the Government should, as a general policy, reserve a license to use without charge in a foreign country any invention which it has the right to use in this country.

B. RIGHT OF CONTROL

It is conceivable that the United States may desire greater rights than a foreign license under an invention to which it owns all the domestic rights. The issue would arise where the relationship of the Government to the invention, based upon the use of public funds or other Federal contribution, makes it necessary or desirable to subject the use of the invention in the foreign country to some control by our Government. It is true that one of the dominating factors for Government ownership of employees' inventions is not present here, viz., the right of the general public to enjoy the products of research which it has financed. Nevertheless, considerations of international goodwill may require that the United States take steps to prevent private control in a foreign country of inventions which have been financed from the Federal Treasury.

Moreover, the foreign patents may conceivably be utilized as the means of obtaining reciprocal advantages for nationals of this country. For example, the United Sates might offer to grant unrestricted licenses under a British patent which it owns, or to grant licenses of such type as the British Government might find desirable, in return for the granting of similar licenses under a comparable United States patent owned or controlled by the British Government. For these reasons, it may be desirable that as to all inventions which become the property of the Government, the Government should also have the right to any foreign patents, or to exercise such degree of control over the invention in foreign countries as the public need may require. In appropriate circumstances, the commercial patent rights may be left to the Government employee or contractor.

If all foreign patent rights vest in the Government, there would be little inducement to the inventor to undertake the expense of prosecuting the foreign application. Hence, the contractor and employee should be required to execute such applications and other documents as may be necessary to obtain a foreign patent, together with an assignment thereof to the United States. Payment of the fees and costs requisite for the prosecution of a foreign patent application would, of course, require authorization by Congress.

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V. Recommendations of Attorney General

1. Under every invention in which the Government acquires a free, nonexclusive license in the United States, it should also acquire a similar license operative in foreign countries.

2. Under every invention to which the Government acquires title in the United States, it should also acquire the right to control the ownership, use and disposition of the foreign patent rights therein.

3. If in respect of any invention acquired by the United States, the head of the agency and the Government Patents Administrator find that control over the foreign rights is not necessary or desirable in the public interest, such rights may be released to the employee or contractor involved, subject to any terms or conditions deemed proper in the public interest.

EXCERPTS FROM FORMAN, "PATENTS, THEIR OWNERSHIP AND ADMINISTRATION BY THE UNITED STATES GOVERNMENT" (1957)

Pages 14–16:

"It has been estimated that during World War II, when the three top supporters of scientific research and development in the Government (War and Navy Departments and the Office of Scientific Research and Development) expended $1.700 billion, more than 80 percent of this sum covered contracts with private corporations, educational institutions, and nonprofit organizations.[32] Obviously, in the absence of a statute which prescribes the disposition to be made of the patent rights arising out of Government contracts,[33] just how the parties agree to an allocation of rights can very materially affect the extent thereof which will accrue to the Government. The practices of the several Government agencies with regard to disposition of patent rights derived from their contractors have conveniently been classified into three groups.[34] One, which generally has demanded Government ownership or control, includes the Rubber Reserve Company and the Defense Plant Corporation, the Department of the Interior, the Department of Agriculture, and the Tennessee Valley Authority. A second, which usually has left the patent rights to the contractor subject only to a nonexclusive, royalty-free license in the Government, includes the War Department (with some exceptions), the Navy Department, the Civil Aeronautics Administration, and the War Production Board. The third group, which has employed the practices of both of the other groups as occasion may appear to warrant a certain course of action, includes the Office of Scientific Research and Development, the National Advisory Committee for Aeronautics and, for a time, the Army's Quartermaster Corps.

"The Attorney General, as one of his recommendations following the Department of Justice's 3-year survey of Government patent practices and policies, urged the establishment of a Governmentwide policy requiring that Government-contracted research and development work should reserve to the United States all rights to inventions produced in the performance of the contract. He further stipulated that in emergencies, where a Federal agency cannot obtain a qualified organization willing to accept a contract with this condition, the contractor may be left with the title to inventions which involved a substantial contribution by the contractor prior to receiving the Government contract.[35] Almost completely on the other side of the fence is one spokesman for nongovernmental interests who challenge this position; he contends that, with the exception of contractors such as commercial laboratories or educational institutions, the Government should be satisfied to receive a royalty-free license and leave title to the patent rights with the contractor.[36] To date there has

[32] Kreeger, "The Control of Patent Rights Resulting From Federal Research," 12 Law and Contemporary Problems 714, 734 (1947); U.S. Natural Resources Committee, "Research—A National Resource," pt. I, 72–74 (1938), pt. II, 1939 (1940); "The Government's Wartime Research and Development," 1940–44, report No. 5 of the Subcommittee on War Mobilization to Senate Committee on Military Affairs, pt. I, 79th Cong., 1st sess. (1945); and report of the Attorney General, "Investigation of Government Patent Policies," vol. 11, 243, 326–327, 409 (1947).

[33] Kreeger, op cit., indicates that there is no such statute, but suggests that a congressional policy could be inferred from a law such as the Synthetic Liquid Fuels Act of 1944, 58 Stat. 191 (1944), 30 U.S.C. sec. 323 (Supp. 1946), which provided for public dedication of patents acquired thereunder.

[34] Kreeger, op. cit., 735.

[35] Report of the Attorney General, op cit. vol. 1, p. 109.

[36] Dienner, "Government Policies Relating to Research and Patents," 13 Law and Contemporary Problems 321, 332 (1948).

been no across-the-board acceptance of either of these policies by the Government agencies, although stiff opposition by industry has led to an apparently growing tendency of some agencies to liberalize contractual conditions so as more and more to permit the contractor to retain commercial rights."

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Page 24:

"The mounting expenditures by the Government for research and development promises to be the major, continuing source of additional patent rights, acquired from both its contractors and its employees. During the fiscal years 1940–44, when the avalanche of dollars took place in the financing of World War II, the Government spent a total of $1,879 million in research and development, of which $915 million went to private industrial laboratories.[48] Nearly 2,000 industrial organizations received research and development contracts, the 10 largest corporations receiving 37 percent of the funds, the 20 largest, 50 percent, the 40 largest, 60 percent, and the 60 largest, 65 percent.[49] It has been estimated that 90 percent of these World War II contracts gave the ownership of any resulting patent rights to the contractor.[50] This practice was directly contra to the 1947 recommendation by the Attorney General that, in the public interest, all rights to inventions made in the course of performing a Government financed contract for research and development should be assigned to the Government,[51] and caused him to reiterate the recommendation in 1950." [52]

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Pages 183–185:

CONCLUSIONS

"Our changing times have witnessed ever-increasing subsidization of research and development activities by the Federal Government, and with this activity inevitably has been associated an increased number of patentable inventions. Whether this trend was precipitated by the needs of recent wars which embroiled the United States, or whether it was the inevitable result of social change, one could hardly guess with any degree of confidence. Regardless of the cause, the fact remains that the Government's share of the Nation's investment in research and development is now a little more than half of the total bill. Further, unless the Government changes its policies of taking title to patents growing out of that investment it probably will soon become the country's largest, single patents owner.

"The primary aim of the present research has not been to study the pros and cons as to whether the Government should maintain policies which continue to increase its patent holdings. These policies have been in existence for over three-quarters of a century, and are hardly likely to be changed notwithstanding scattered objections occasionally voiced by nongovernmental interests. The objects here, instead, have been to review the basis for the acquisition of patent rights by the

[48] Report by the Attorney General to the President, dated Dec. 7, 1950, p. 16, as required by sec. 703(c) of the Defense Production Act of 1950 (Public Law 774, 81st Cong., Sept. 8, 1950).
[49] Report of the Smaller War Plants Coporation, "Economic Concentration and World War II," 79th Cong., 2d sess., S. Doc. 206, p. 52 (1945).
[50] Report of the Smaller War Plants Corporation, "Economic Concentration and World War II," 79th Cong., 2d sess., Senate Committee Print No. 6, p. 53 (1945).
[51] Report of the Attorney General, op. cit., vol. 1, p. 4.
[52] Report by the Attorney General to the President, dated Dec. 7, 1950, op. cit., pp. 17–18.

Government's ownership and utilization of patents. The review has covered the sources and legality of the Government's patent rights as well as the value thereof to the Government. In studying the policy developments consideration was given to the major proposals made by the legislative and executive branches for the Government's acquisition and administration of patents, to the establishment and operation of a single agency to administer the Government's ownership policy, to the current policy for exercising the Government's patent rights, and some proposals for change thereto.

"With respect to the sources, barring a major change in policy which would result in title being taken to fewer patents or inventions made by its contractors [1] and by its employees, the conclusion reached is that the Government's patent rights will continue rapidly to mount in number. The principal single source has been the vestings in the Alien Property Custodian of rights to American patents formerly held by enemy aliens. But the major continuing and growing source is the Government's program of research and development work.

"With respect to the legal nature of the Government's patent rights the conclusion reached is that it is perfectly lawful for the Government to acquire interests in patents. Further, there is no sound basis in the theory that when patents are owned by the Government they become merged with the public interest and lose their identity as patents; that is, that they become dedicated to the public. The Government can hold patents like any other property, and it can sell them, license, or lease them like any other form of property.

"With respect to the value of patent rights to the U.S. Government, there is no doubt that they can be of considerable value on two main counts: (*a*) as a defensive measure, so that would-be infringement claimants can be warded off or protected against; and (*b*) as a means toward improving the Nation's general welfare by aiding in the progress of the useful arts and sciences. That the Government needs all possible defensive measures is emphatically shown by the fact that in the past 35 years it has been presented with claims, in actual litigation, of over $4⅓ billion. Yet the Court of Claims found the Government liable only to the extent of $6½ million, showing clearly that the Government must defend against overinflated claims which can be defeated or diminished if adequate defenses are available. That the Government's patents can be used to enhance the country's welfare is a point which will be commented on more fully later in discussing the ways in which these patents can be exercised."

[1] Note: Prior to Jan. 4, 1955, sec. IX of the Armed Services Procurement Regulation stipulated certain circumstances pursuant to which the Government would demand from its contractors an assignment of rights to all inventions made in the performance of the contract, subject only to a nonexclusive, royalty-fee license to the contractor. After that date the ASPR stipulated that the Government would require only a license under those same circumstances.

EXCERPTS FROM REPORT OF SENATE SUBCOMMITTEE ON PATENTS, TRADEMARKS, AND COPYRIGHTS, SENATE REPORT 97, 86TH CONGRESS, 1ST SESSION

MARCH 9, 1959.—Ordered to be printed

Mr. O'MAHONEY, from the Committee on the Judiciary, submitted the following

REPORT

[Pursuant to S. Res. 236, agreed to February 5, 1958]

INTRODUCTION

The program of the subcommittee during the second session of the 85th Congress has been designed to sustain the public interest and to improve the patent law during a period which has been marked by unprecedented advances in the fields of technology and science. During this period the Government has been compelled, for reasons of defense, to engage in unparalleled research, the cost of which has been steadily increasing. The National Science Foundation, in its report for fiscal years 1956, 1957, and 1958, shows that research appropriations throughout the Government, amounting to more than $1 billion in 1949, had exceeded $3 billion by 1958, and the President's budget for 1960, just submitted to Congress, asks for over $5 billion for research and development, more than $3½ billion of this total for the Defense Department alone.

It is set forth in the President's budget ("Special Analysis H," p. 989) that:

> Expenditures for other than major national security programs are estimated at $912 million in 1960 or 17 percent of total Federal research and development expenditures.

Although there are 18 different Government agencies holding patents or licenses under inventions produced by expenditure of Federal funds, studies conducted by the subcommittee reveal that there is no uniformity of policy, no coordinated program, followed by these agencies in regard to their patents. While vast sums of money are being spent for research and development, which sometimes lead to patentable inventions, there is no agreement among the agencies

as to the manner in which the patents and licenses they hold may be used. The subcommittee has published preliminary reports as to the practices of two Federal agencies with research responsibilities, the Tennessee Valley Authority and the National Science Foundation, and they reveal a wide divergence in views as to the best matter to protect the public interest in Government-developed inventions. Similar preliminary reports on the patent policies of the other 16 agencies which hold patent rights will be published as they are completed. They will be followed by a report considering possible changes in their patent practices.

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B. PENDING INVESTIGATIONS

1. Government agency patent practices

One of the most significant activities of the subcommittee since 1957 has been its continuing investigation of the patent policies of Government agencies. Elaborate questionnaires were sent to substantially all of the patent holding agencies, and were supplemented by a continuous flow of correspondence and interviews clarifying the voluminous answers received. The agencies in question are:

Agriculture, Department of
Air Force, Department of
Army, Department of
Atomic Energy Commission
Commerce, Department of
Federal Communications Commission
General Services Administration
Government Printing Office
Health, Education, and Welfare, Department of
Interior, Department of the
Justice, Department of
National Aeronautics and Space Administration (formerly NACA)
National Science Foundation
Navy, Department of
Post Office Department
Tennessee Valley Authority
Treasury, Department of
Veterans' Administration

While it was originally intended that the data thus assembled would be summarized and analyzed in a single report, the agency patent practices under consideration have been disclosed to be so diverse and so extensive that it now seems desirable to issue a series of reports, agency by agency, as they are completed. This procedure will be necessary to make this important material available to the public while it is still reasonably current.

The subcommittee's first effort has been to summarize the facts as to each of these agencies' legal authority to deal with patents, what their current patent practices are and what, if any, changes in these practices the agencies themselves regard as desirable. The staff is currently preparing for publication a series of these preliminary reports which will summarize the data supplied by each of the agencies

in factual form, without critical analysis. It is proposed to follow these factual reports with a final report discussing the problems raised by the various agency policies and outlining the additional facts needed for informed legislative judgment as to what to do about these problems.

The subcommittee has learned through this investigation that much of the information needed to resolve intelligently the difficult problem of when the Government should and when it should not take title to a patent is not presently available from the agencies under study. An important factor in determining whether a given agency should or should not take title to patents for the Government, would appear to be the use which has been made of the patents to which title has been taken in the past. Yet many of the agencies involved do not know and have no ready means of finding out. Similarly, in determining whether title to a patent should be left with a Government research and development contractor, it would be extremely helpful to know the past use made of such titles. A number of agencies are presently in ignorance of these facts. The subcommittee is attempting to obtain information of this character from some of the licensees; however, such information cannot be complete until the agencies themselves undertake to assemble it.

The data that the subcommittee has assembled concerning all of the agencies should be of great value to all persons seeking information as to the circumstances under which the Government's retention of title to a patent, or direct control over the patentee's licensing activity is feasible and desirable. However, the information received from the agencies with special statutory responsibility to make the benefits of their research activities available to the general public, such as TVA, Department of Agriculture, Department of Health, Education, and Welfare and the Veterans' Administration, is of special significance. Such agencies necessarily must keep informed as to the use made of the patents produced by the research they sponsor, regardless of whether the agency retains title or not, and the information supplied by them as to patent use is therefore more complete than that possessed by most of the other agencies. For this reason, and because the practices of these agencies have received relatively little attention in comments on Government patent policies published to date, the reports concerning them will be among the first published.

The problem of Government patent policy is a continuing one, which becomes increasingly complex as Government sponsored research broadens and new agencies with patent responsibilities evolve, such as the National Aeronautics and Space Administration. Therefore, no single report can be a definitive statement of the problems involved or a comprehensive summary of all of the relevant data. Nevertheless, it is believed that these reports will supply a much-needed supplement to the last comprehensive investigation of Government agency patent practices, which culminated in the "1947 Report of the Attorney General." With this in mind, care is being taken to avoid repetition of data in that report and to emphasize subsequent developments.

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NOTE.—For references to additional studies and reports on patent policies of other Federal agencies, see letter dated November 5, 1958, from Roland A. Anderson, Chief Patent Branch, AEC, to David Toll, staff counsel, Joint Committee on Atomic Energy, reprinted at pp. 64–65 of this print.

CHAPTER VIII. ARTICLES ON ATOMIC ENERGY PATENTS

SOME PATENT ASPECTS OF ATOMIC POWER DEVELOPMENT *

BENNETT BOSKEY **

In these early years of the Atomic Revolution, a mood of transition is widely manifest. This mood helps to sustain our hopes for achieving, through the atom, not annihilation, but, instead, the vast betterment of all mankind. It affects the scope and the pace of our industrial activities. It exerts its influence on the course of our diplomatic negotiations, as well as on the programs of our great institutions of learning. And, needless to say, it is reflected in the Atomic Energy Act of 1954,[1] the statute which sets the legal bounds of our atomic energy endeavor.

When this important congressional enactment became the law on August 30, 1954, the event marked the end of one era and the beginning of another in the atomic energy policy of the United States. A primary aim of the new act was to terminate the tight Atomic Energy Commission monopoly which the Congress had established in the original Atomic Energy Act of 1946.[2] This was in recognition of the fact—though it was by no means a simple fact—that the changes occurring between 1946 and 1954 had gradually made it clear that, if continued, the AEC monopoly would become a national liability. Accordingly, in the 1954 act, by extensive relaxation of the earlier legislative prohibitions, the Congress sought to make it possible for the full talents and resources of the nation to apply themselves energetically and unremittingly to the problems of atomic energy. This does not contemplate merely a greater measure of participation in atomic energy development on the part of the power systems which some day hope to generate, transmit, distribute, and sell the nuclear power. It also contemplates participation by the equipment manufacturers, the chemical companies, the metal fabricators, the processors of all kinds of specially adapted materials, the manufacturers of instruments and controls, and the many other groups whose contributions are needed for the development of the art.

Basically, the problem is not, and has not been, to determine whether nuclear power can actually be produced. We know that it can, and we have known this for probably at least a decade. The real problem is to discover the ways by which nuclear power can be produced on an economic basis, genuinely competitively with the cost of power from conventional sources. For the regions where conventional power comes at high cost, such a competitive basis may now seem to be on the horizon;[3] but for the regions where conventional power comes at medium or low

*Reprinted from 21 Law and Contemporary Problems 113–131 (Duke University Law School, Winter, 1957).

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[1] 68 STAT. 921, 42 U.S.C.A. §§2011–2281 (Supp. 1954).

[2] 60 STAT. 755, 42 U.S.C. §§1801–19 (1946).

[3] Elsewhere in this symposium, the economic factors are considered in greater detail. See Leppke,

cost, the struggle to achieve the necessary cost reductions has hardly begun. The rapidity with which this can be accomplished will be a measure of the act's success in carrying out its declared purpose, in section 3(a), of "conducting, assisting, and fostering research and development in order to encourage maximum scientific and industrial progress."[4]

The 1954 act was intended to encourage and facilitate the widespread dissemination of the abundant technical information and know-how which, though previously narrowly confined, must be made more generally available if our atomic progress is to flourish. Likewise, it was intended to enable private enterprise (including public-power groups) to develop, invest in, and own facilities—and the components of facilities—which will produce nuclear power and special nuclear material. And in many ways, the new act specifically addresses itself to these problems of transition, at least so far as such problems could readily be foreseen. The Congress certainly hoped that the legislation would create conditions under which, as the state of the art permitted, changes could be effected promptly, taking full advantage of technological advances and the teachings of experience. At the same time, numerous statutory safeguards were adopted in order to maintain what the Congress felt was a proper balance between private interests and the public interest.

This paper will discuss some of the patent aspects of the Atomic Energy Act of 1954. Patents may appear to be a subject of rather narrow scope, but they are here referred to in their broader sense—their relation to the advancement of technology, their significance for the development of atomic power, their effects upon the practices and habits of industry, the special problems encountered in a transitional period, and the nature of the balancing safeguards included in the act.

Patent laws, it must be remembered, are not ends in themselves, but rather the means by which society seeks to attain objectives of high importance. As Chief Justice Marshall said in one of the Supreme Court's very early patent opinions, "To promote the progress of useful arts is the interest and policy of every enlightened government."[5] Traditionally, and virtually since the birth of the Republic, the United States has looked to the patent system to provide a stimulus to our scientific and industrial progress. It is in no sense the only stimulus, but it is a powerful one.

The significant benefits of the patent system may be summarized very simply: A patent confers a temporary legal monopoly. The promise of this temporary patent monopoly creates a prospect of pecuniary reward. It fosters inventive effort on the part of both the small inventor and the large company. In many instances, it supplies justification for the huge outlays of private capital required to support the

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The Facts of Atomic Power Development, supra, 3-13; Tybout, *The Public Investment in Atomic Power Development, supra,* 60-90. In addition, for a summary of some of the best evidence and opinion now available, consult the papers delivered at the International Conference for the Peaceful Uses of Atomic Energy, held in Geneva, Switzerland, August 1955, particularly, *Economics of Nuclear Power,* by James A. Lane, of Oak Ridge National Laboratory, and *Capital Investment Required for Nuclear Energy,* by W. Kenneth Davis, Director of the AEC's Division of Reactor Development.

[4] 68 STAT. 922, 42 U.S.C.A. §2013(a) (Supp. 1954).

[5] Grant v. Raymond, 10 U.S. (6 Pet.) 218, 241 (1832).

intensive research and development effort which must so often precede the moment of invention or discovery. And, at the same time, this temporary legal monopoly provides an inducement for the inventor to make a public disclosure of his technical achievements which, when thus disclosed through publication of the patent, become available to the country as a whole as a base for further technological advancement. The public interest thus benefits both from the stimulation of inventive effort and from the public disclosure.[6]

The patent system, to be sure, is not without its pitfalls and its abuses. But since the very first Patent Act of 1790, it has been our consistent judgment that the wise and prudent national policy is to strengthen and conserve the patent system. We have sought to remedy the abusive practices not by destroying or undermining the patent system as a whole, but by fashioning specific measures adequate to cope with the abuses.[7]

These broad considerations are all well known. They are mentioned here, however, in order to be sure that the discussion of the special patent aspects of the atom does not become too distantly separated from its more general setting.

The Atomic Energy Act of 1954 is a statute of unusual length. It occupies forty-two closely printed pages, and, thus, is considerably longer than the United States Constitution as originally adopted. About six of the act's pages deal directly and extensively with various aspects of patents and inventions. Instead of undertaking to cover every one of these patent and invention provisions,[8] this discussion rather will concentrate on certain of their aspects that are of particular interest at the present time—namely, the incentives provided by patents and awards in the field of atomic energy; compulsory licensing; the special reporting requirements for atomic energy inventions; and the troublesome, and perhaps largely unanticipated, patent difficulties which the law creates in connection with contracts, subcontracts, arrangements, and "other relationships" with the Commission.

In considering all such matters, it is well to bear in mind the overriding importance of attaining in this country a maximum level of invention and technological

[6] To quote once again from Chief Justice Marshall's opinion in Grant v. Raymond, *supra*, the patent "is the reward stipulated for the advantages derived by the public for the exertions of the individual, and is intended as a stimulus to those exertions." 10 U.S. (6 Pet.) at 241-42.

[7] For example, the antitrust litigation of the past few decades has unearthed a variety of abusive patent practices which have met with vigorous corrective action by the federal courts. *E.g.*, Hartford-Empire Co. v. United States, 323 U.S. 386 (1945); United States v. United States Gypsum Co., 333 U.S. 364 (1948); United States v. New Wrinkle, 342 U.S. 371 (1952). The Atomic Energy Act of 1954 contains affirmative provisions designed to reduce the opportunities for antitrust violations to occur in the atomic energy field. See particularly the general provisions in §105, 68 STAT. 938, 42 U.S.C.A. §2135 (Supp. 1954); and the further provision in §158, 68 STAT. 947, 42 U.S.C.A. §2188 (Supp. 1954), to the effect that if any patent in the atomic energy field is found by a court to have been intentionally used in a manner so as to violate the antitrust laws, then the court may require the patent to be subject to compulsory licensing on a reasonable royalty basis, and this is "in addition to any other lawful sanctions."

[8] In an article entitled *Patents Under the New Atomic Energy Act*, 36 J. PAT. OFF. SOC'Y 867 (1954), I have attempted to discuss, at least briefly, each of the act's provisions relating to patents and inventions. See also the illuminating address by Casper W. Ooms, *Revisions of the Patent Provisions—Good or Bad?*, NATIONAL INDUSTRIAL CONFERENCE BOARD, CONFERENCE ON ATOMIC ENERGY IN INDUSTRY 279 (1954).

advancement throughout the field of atomic energy. We live in a world intensely competitive. On both the national defense and the peaceful sides of the atom, the necessity of maintaining our position of leadership is generally understood. Perhaps after the International Conference for the Peaceful Uses of Atomic Energy, held in Geneva, Switzerland, in August 1955, this has become understood even more clearly than it was before.

Great as our atomic energy progress has been since 1942, we know vaguely that we are yet only on the threshold of discovery. There is still truth today in what John Stuart Mill wrote more than a hundred years ago:[9]

> Our knowledge of the properties and laws of physical objects shows no sign of approaching its ultimate boundaries; it is advancing more rapidly, and in a greater number of directions at once, than in any previous age or generation, and affording such frequent glimpses of unexplored fields beyond, as to justify the belief that our acquaintance with nature is still almost in its infancy.

How well, therefore, are the patent provisions of the 1954 Atomic Energy Act adapted to speeding us forward into these "unexplored fields beyond"?

The System of Patent and Award Incentives

To understand what the 1954 act accomplishes by way of patent incentives, it is necessary to consider the situation which the 1946 act created and then to reflect upon how that has been modified.[10]

A basic feature of the 1946 act was that it removed from the regular patent system two important areas—first, atomic weapons, and second, the production of fissionable material. The reasoning underlying this was clear and simple. The two areas were, under the 1946 act, areas of government monopoly; accordingly, in these areas, the private monopoly of a patent could have no scope for normal operation and hence would have little meaning. What the 1946 act provided was that an invention, to the extent it was useful in either of these areas, should be excluded from the regular patent system. The inventor was, to that extent, disabled from obtaining a patent monopoly on it. But the act did not lose sight of the importance of providing some substitute pecuniary incentive and reward in these areas. This was supplied by affording to the inventor—in lieu of the right to obtain a patent—a right to apply for and obtain a statutory award from the Commission in a formal proceeding conducted before the AEC Patent Compensation Board. The amount of the award was left to the Board to determine in the light of certain valuation standards set forth in the act.[11]

[9] John Stuart Mill, Principles of Political Economy Bk. 4, c. 1, §2, at 422 (People's ed. 1880).

[10] For more extensive discussion of patent developments under the original Atomic Energy Act, see Ooms, *The Patent Provisions of the Atomic Energy Act*, 15 U. Chi. L. Rev. 822 (1948); Boskey, *Inventions and the Atom*, 50 Colum. L. Rev. 433, and 32 J. Pat. Off. Soc'y 563 (1950); Boskey, *Operation of the Patent Provisions of the Atomic Energy Act*, 32 J. Pat. Off. Soc'y 808 (1950); Ooms, *Problems of Patent Policy for Government and Industry in Atomic Energy*, in Atomic Energy Industrial and Legal Problems 155 (1952).

[11] The work of the AEC Patent Compensation Board under the 1946 act is considered at some length

In the new act of 1954, the entire field of atomic energy development is restored to the patent system, except for the area of atomic weapons which remains very much as before. Atomic weapons production has, for obvious reasons, been kept a government monopoly, and, as a corollary, the atomic weapons area has been left outside the regular patent system. Thus, an invention still cannot be the subject of patent rights to the extent that the invention is useful "in the utilization of special nuclear material or atomic energy" in atomic weapons; this is the consequence of the terms of section 151 of the act.[12] In such a case, the inventor has the same right which he had previously—that is, to apply to the AEC Patent Compensation Board for a suitable award.[13]

In view of the government monopoly over atomic weapons production, however, a patent itself would hardly do any more for the inventor, other than to confer the rather doubtful privilege of being able to proceed in the first instance in the Court of Claims[14] instead of before the AEC Patent Compensation Board, whose decisions are subject to judicial review.[15] Indeed, though generalization may be risky, there seems to be good ground for taking the view that an inventor who has made a real contribution in the atomic weapons area is likely to fare better in an award proceeding before the AEC Patent Compensation Board than he would in a suit in the Court of Claims.[16] Under all the circumstances, therefore, it is hard to believe that the exclusion of the atomic weapons area from the regular patent system actually has any negative effect on technical progress, or that any greater stimulation of invention would be provided if patent rights were allowed to extend into this area.

There are, of course, problems of interpretation which this portion of the act brings with it—for example, questions as to the exact limit of the definition of

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in the articles cited in note 10, *supra*. Under the 1954 act, the principles applicable to proceedings before the Board will continue to be largely along lines begun under the 1946 act, but it may now be necessary for the Board to function on a much more extensive scale. A significant rise in the volume of cases brought to the Board is likely to result from the great increase in the amount of independent work which will now be carried on in the atomic energy field. Moreover, as will appear below, the Board's statutory jurisdiction to grant awards has been substantially broadened by the 1954 act. In addition, by virtue of §173 of the act, 68 STAT. 953, 42 U.S.C.A. §2223 (Supp. 1954), and of the recently promulgated §80.10(d) of the Commission's regulations, 20 FED. REG. 3931 (1955), the Board now has jurisdiction to determine the just compensation to be paid in the event that restricted data contained in a privately owned patent application is communicated by the AEC to some foreign nation. See also, AEC EIGHTEENTH SEMIANNUAL REP. 100 (1955). It is important to note that the procedural changes which the Commission has made in its regulations subsequent to the new act, 20 FED. REG. 3931 (1955), do not modify the basic provision, §80.60(c), of the regulations adopted by the Commission under the 1946 act to the effect that "the order of the Board shall constitute the final action of the Commission."

[12] 68 STAT. 943, 42 U.S.C.A. §2181 (Supp. 1954).

[13] See §157, 68 STAT. 947, 42 U.S.C.A. §2187 (Supp. 1954).

[14] Pursuant to 28 U.S.C. §1498 (Supp. 1952).

[15] See §189, 68 STAT. 955, 42 U.S.C.A. §2239 (Supp. 1954).

[16] One of the reasons for this is that the Board is more likely to be able to grapple successfully with the problem of secrecy—which may be particularly acute in the atomic weapons area—and to give proper evaluation to the contribution which the inventor has made. See Boskey, *Inventions and the Atom*, 50 COLUM. L. REV. 433, 440-46, and 32 J. PAT. OFF. SOC'Y 563, 572-81 (1950).

"atomic weapon" which appears in section 11(d).[17] But such peripheral problems do not appear to be of large dimension, nor do they create major uncertainties which would impair the effectiveness of the act.

Thus, in the atomic weapons area, the patent situation remains essentially as before. Perhaps one further point should be noted, since it is of particular interest in connection with atomic power development. An invention may have a double usefulness; it may be useful in the atomic weapons area and useful likewise, for example, in the production of special nuclear material. The act makes it clear that the exclusion of such an invention from the patent system is an exclusion which operates only to the extent the invention is useful in the atomic weapons area. With respect to its other uses, this same invention may be the subject of a patent to which normal patent rights attach. This is the result of the basic change of approach which the 1954 act embodies. For, in the 1954 act, as a concomitant of the changes which now make it possible for private enterprises to own their own reactors and other facilities for the production of fissionable material, the whole area of inventions useful in the production of fissionable material is restored to the patent system. Moreover—although this was sometimes overlooked—the area of inventions useful in the production of nuclear power had never been taken out of the patent system, even by the 1946 act.[18] Consequently, the entire field of atomic power development is now, for all practical purposes, firmly within the patent system which operates in other industrial fields.

This must, however, be understood to be subject to certain special conditions which the Atomic Energy Act makes applicable to inventions in the field of atomic energy alone. The most important of these special conditions arise from the provisions on compulsory licensing, on reporting requirements, and on commission relationships—all to be discussed below. Before proceeding to that discussion, however, an additional word should be said concerning an extra incentive which the 1954 act provides in the form of a right to an award.

Under the 1946 act, the right to an award was established only as a substitute for patent rights. But in the new act, while the right to a patent has, as we have seen, been broadened considerably, nevertheless, the right to an award has not been correspondingly narrowed; instead, it too has been broadened. This becomes ap-

[17] 68 STAT. 922, 42 U.S.C.A. §2014(d) (Supp. 1954). Note, however, that the definition of "atomic weapon" in §11(d), when read in conjunction with the definition of "atomic energy" in §11(c), 68 STAT. 922, 42 U.S.C.A. §2014(c) (Supp. 1954), establishes that "atomic weapon" is meant to include fusion weapons as well as fission weapons—that is, H-bombs as well as A-bombs. The language of the act makes this clear, as does the legislative report of the Joint Committee on Atomic Energy, which states, "This definition [of 'atomic energy'] includes both fission and fusion types of nuclear reactions." H.R. REP. No. 2181, 83d Cong., 2d Sess. 11 (1954).

[18] This was with the possible exception of inventions used simultaneously (as, for example, in a dual-purpose reactor) to produce both nuclear power and fissionable material. See Boskey, *The Atomic Energy Act and the Power Question*, Nucleonics, Oct. 1952, pp. 10, 13; and also testimony before the Joint Committee on Atomic Energy on May 11, 1954, in *Hearings before the Joint Committee on Atomic Energy on S. 3323 and H.R. 8862, To Amend the Atomic Energy Act of 1946*, 83d Cong., 2d Sess., pt. 1, at 129 (1954). The term "fissionable material," which was used in the 1946 act, has been superseded by "special nuclear material" in the 1954 act.

parent from section 157(b)(3), which provides in substance that any person "making any invention or discovery useful in the production or utilization of special nuclear material or atomic energy" may apply to the AEC for an award and that the AEC may grant an award.[19] Thus, the right to apply for an award is by no means confined to the atomic weapons area, which is the only area now excluded from the patent system. By a deliberate decision of the Congress, the award system has been extended throughout virtually the entire atomic energy field. It is a stimulus which the 1954 act has provided in addition to, rather than merely in lieu of, the right to obtain a patent, and it affords the inventor an opportunity both for recognition and for pecuniary reward which is supplemental to his rights under the patent system.[20]

Particularly to the small inventor who is able and willing to perform independent work in the field of atomic power development, this additional stimulus may be a matter of especial importance. The field is one where the serious prosecution of a patent application, at least in the case of a somewhat complex invention, may become highly expensive and burdensome. Moreover, the hazards and uncertainties of the ultimate outcome in the Patent Office are greatly increased because of the vast amount of prior art that has been kept from public disclosure by virtue of Patent Office secrecy orders often extending over a period of many years.[21] Accordingly, whereas the prospect of trying to prosecute a patent application may, in some cases, seem rather bleak and uninviting, in those same cases, the possibility of obtaining a statutory award under section 157(b)(3) of the act may provide a genuine incentive.[22]

[19] 68 STAT. 947, 42 U.S.C.A. §2187(b)(3) (Supp. 1954).

[20] In connection with the use of awards as a supplemental stimulus to invention, it should be noted that on July 30, 1955, the House of Representatives passed H.R. 2383 (to be called the Inventive Contributions Awards Act), 101 CONG. REC. 10602 (daily ed. July 30, 1955), which would authorize the National Inventors Council within the Department of Commerce to make awards for meritorious inventive contributions to the national defense, when such inventive contributions have been communicated to and used by a "defense agency" (exclusive of the AEC). If such legislation is enacted, it would furnish a basis for statutory awards in fields other than atomic energy; and, like the awards (except in the atomic weapons area) under §157(b)(3) of the Atomic Energy Act of 1954, such awards would be supplemental to, rather than in lieu of, patent rights. The purpose of the bill is to foster invention for national defense and to remedy the very unsatisfactory situation which presently exists because of the fact that the sole recourse of the inventor is generally in the Court of Claims. See *Hearings before Subcommittee No. 3 of the House Committee on the Judiciary on H.R. 639 and H.R. 2383, Inventive Contributions Awards Board*, 84th Cong., 2d Sess. (1955); and also H.R. REP. No. 1432, 84th Cong., 1st Sess. (1955). The bill is now pending before the Senate Committee on the Judiciary.

[21] Presumably, these secrecy orders will begin to be lifted more rapidly as a result of the Commission's recent enlargements of the areas of information being declassified. But even in such cases, it is to be anticipated that there will often be a substantial time lag between the declassification of certain technological information and the actual lifting of the Patent Office's secrecy order on the corresponding patent application.

[22] In addition to this statutory right to apply for an award, which is established by the first sentence of §157(b)(3), the second sentence of §157(b)(3) goes on to provide that: "The Commission may also, upon the recommendation of the General Advisory Committee, and with the approval of the President, grant an award for any especially meritorious contribution to the development, use, or control of atomic energy." This latter provision was first used to make an award of $25,000 to Enrico Fermi, shortly before his death, and the Commission has announced that future awards of this category will be known as the Fermi Prize. See AEC SEVENTEENTH SEMIANNUAL REP. 38-40 (1955). It should be noted that under the terms of the act, such an award need not necessarily be based on an "invention or discovery," but may be conferred for some other type of "especially meritorious contribution" as well.

Compulsory Licensing

The subject of compulsory licensing is highly controversial and often misunderstood. One viewpoint considers that patents in all fields of industrial activity should be subject to some type of compulsory licensing requirements, as they are in certain countries abroad. Another viewpoint considers that any form of compulsory licensing authority—even when confined to the field of atomic energy, and there on a very limited basis—represents a vicious and, indeed, unconstitutional inroad upon the patent system. Perhaps most people take a somewhat middle view, and, in any event, that is what the Congress has done in the 1954 Atomic Energy Act.

In the 1946 act, section 11(c), enacted after much heated debate, had given the AEC fairly broad authority—and, indeed, had placed the AEC under a duty—to declare a patent to be affected with the public interest if both of two conditions were met: (1) that the invention "utilizes or is essential in the utilization of fissionable material or atomic energy," and (2) that compulsory licensing was "necessary to effectuate the policies and purposes of this Act."[23] The consequences of thus declaring a patent affected with the public interest would have been twofold. First, the AEC itself would then have been licensed to use the invention on a reasonable royalty basis—a somewhat superfluous grant of authority in view of the general right which the Government possesses to use all patented inventions and to remit the patent owner to his remedy for compensation in the Court of Claims.[24] Second, and more important, a license to use the invention on a reasonable royalty basis would also have been conferred automatically upon anyone who held a section 7 (of the 1946 act) license relating to utilization of atomic energy.[25]

No section 7 license relating to utilization of atomic energy was ever issued by the AEC under the 1946 act, because the provisions of section 7 did not come into operation. Accordingly, the occasion for declaring any particular patent to be affected with the public interest did not really ever arise, nor was it ever necessary that the possibility of doing so in a particular case be given serious consideration. The AEC, at a fairly early date, and partly in the hope of allaying some of the public misunderstanding concerning this portion of the act, took pains to describe the compulsory licensing authority as a "reserve power" to be used "under certain rather exceptional circumstances."[26] Thus the matter rested, with the controversy slumbering but not stilled, at the time the act came up for general revision.

In the hearings on the new act, various shades of opinion concerning the compulsory licensing provisions were given full expression before the Joint Committee on Atomic Energy.[27] The view that prevailed in the Congress was that, during

[23] 60 Stat. 768, 42 U.S.C. §1811(c) (1946).
[24] See 28 U.S.C. §1498 (Supp. 1952).
[25] 60 Stat. 764, 42 U.S.C. §1807 (1946).
[26] See AEC Fifth Semiannual Rep. 148 (1948).
[27] Varying views on this aspect of the patent provisions had been expressed by witnesses testifying before the Joint Committee on Atomic Energy during the course of the preliminary hearings, entitled *Atomic Power Development and Private Enterprise*, held in June and July 1953 (83d Cong., 1st Sess.). President Eisenhower's message of February 17, 1954, recommending revision in the atomic energy

this period of transition, for special reasons which would not apply in other fields of industry, it would be advisable to retain a very limited form of compulsory licensing authority in the field of atomic energy. Although voted down by the House, this was insisted upon by the Senate and became a part of the final enactment.[28]

The basic purpose of the limited compulsory licensing authority which thus remains in the law is to provide, during the transitional period, a safeguard which will help to assure the widest practicable participation in the atomic energy program. As such a safeguard, it may partially offset the initial inequality of opportunity resulting from the AEC monopoly which existed under the 1946 act but which should largely disappear during the years to come. The power is one which the Commission may never be called upon to exercise; yet, its mere presence in the law is a safety valve which may prevent abusive or unhealthy conditions from being created as this industry emerges from the cocoon of secrecy and government monopoly.

Examination of the detailed compulsory licensing provisions of the 1954 act will show how very strictly the Congress has confined the Commission's authority in this respect, and, hence, how groundless are the fears that some vital inroad has been made upon the patent system. The rather general authority which the Commission possessed under the 1946 act has been considerably narrowed. Under the new act, it is not nearly enough, as it was before, that the invention is found to come within a broadly defined atomic energy field and that the AEC should determine compulsory licensing to be necessary to effectuate the policies and purposes of the act. Instead, section 153(a) now requires that, before declaring a patent to be affected with the public interest, the Commission must find that the invention "is of primary importance in the production or utilization of special nuclear material or atomic energy"; and before such determination is made, the act directs the Commission to give the patent owner an opportunity for hearing.[29] Furthermore, section 153(b)(2) requires that, even after such determination has been made, a compulsory license on a reasonable royalty basis shall be issued to a particular applicant only if the Commission finds his proposed use "is of primary importance to the conduct of an activity by such person authorized under this act."[30] It is not wholly clear

legislation, included a recommendation that some form of compulsory licensing authorization be retained for a limited period because "considerations of fairness require some mechanism to assure that the limited number of companies, which as Government contractors now have access to the program, cannot build a patent monopoly which would exclude others desiring to enter the field." H.R. Doc. No. 328, 83d Cong., 2d Sess. 7 (1955). Considerable testimony on the subject of compulsory licensing, covering a wide range of views, was again received by the Joint Committee in the public hearings which immediately preceded the enactment of the law. See *Hearings, supra* note 18.

[28] See especially the Statement of the Managers on the Part of the House, in the second conference report, H.R. Rep. No. 2666, 83d Cong., 2d Sess. (1954), appearing at 100 Cong. Rec. 14867 (1954), and the accompanying legislative debate. The legislative history is set forth in greater detail in note 44 *infra*.

[29] 68 Stat. 945, 42 U.S.C.A. §2183(a) (Supp. 1954).

[30] 68 Stat. 945, 42 U.S.C.A. §2183(b)(2) (Supp. 1954).

from the act itself whether the patent owner is entitled to a hearing on the issues raised by the particular application, but it appears that the AEC does intend, by its regulations, to assure to the patent owner this important procedural safeguard.[81]

Here then, in consequence of the terms of section 153(a) and 153(b), is a new double-barreled, "primary importance" test which places significant statutory limitations on the scope of the Commission's authority. While the meaning of the phrase "primary importance" may not be entirely self-evident and may require elucidation from records developed before the Commission in particular cases if they should ever arise, the act itself plainly was intended to lay down a basic principle that the compulsory licensing power cannot be exercised merely as a matter of routine or to carry out some relatively inconsequential purpose.

In addition, section 153 provides an alternative procedure whereby compulsory licensing proceedings may be initiated by an outsider who wants to obtain such a license, rather than by the AEC itself. For such a case, there are detailed procedural provisions which assure the patent owner the protection of a full hearing. Moreover, here the Commission's authority is once again hedged in by the "primary importance" test, but this time on a triple-barreled basis. Not only must the Commission find that the invention is of "primary importance" in the field and that obtaining the compulsory license is of "primary importance" to the applicant; the Commission is also required to find that the applicant's proposed activities are of "primary importance" to the furtherance of policies and purposes of the act. In addition, the Commission must find that the applicant cannot otherwise obtain a patent license from the patent owner on terms which the Commission deems reasonable. Then, and only then, may the AEC issue a compulsory license under this alternative procedure.[82]

It will, thus, be seen that, under either of the procedures set forth in the statute, the Congress has surrounded the compulsory licensing power by a series of restrictive conditions which would make it virtually impossible for that power to be exercised except in a comparatively rare and factually compelling case. Indeed, this would be true even if the Commission itself were not predisposed—as it so clearly is by its belief in the importance of the patent system—to regard compulsory licensing as a "reserve power."[83] The power could be exercised, if necessary in some exceptional case, to prevent the progress of the entire industry from being blocked by an unduly

[81] This was not evident either from the proposed regulations on Standard Specifications for the Granting of Patent Licenses, which the AEC issued on April 7, 1955, 20 FED. REG. 2283 (1955), or from the proposed regulations on Rules of Practice, which the AEC issued on August 10, 1955. *Id.* at 5786. But there have been informal indications that, when the full set of AEC regulations is issued in final form, this safeguard will be expressly provided for.

[82] 68 STAT. 945, 42 U.S.C.A. §2183(c), (d), (e) (Supp. 1954).

[83] See, for example, the Commission's statement in *Hearings, supra* note 18, pt. 2, at 597. In testifying before the Joint Committee on February 4, 1955, in *Hearings before the Joint Committee on Atomic Energy on Development, Growth, and State of the Atomic Energy Industry*, 84th Cong., 2d Sess. pt. 1, at 194 (1955), William Mitchell, the AEC General Counsel, stated: "The compulsory licensing provisions of §153 of the act are deemed by the Commission to establish a reserve power. It is not anticipated that this authority will be invoked, except under compelling circumstances."

wide monopoly over a vital invention. Only the future can tell us whether any such situation will ever arise with respect to the inventions or discoveries which come into existence before September 1, 1959.[34]

Reporting Requirements

The 1946 act contained a 60-day reporting requirement for inventions in those areas of atomic energy which the act excluded from the regular patent system.[35] By section 151(c) of the 1954 act, the 60-day period has been increased to 90 days,[36] and this undoubtedy makes compliance considerably more practicable. But more important, section 151(c) has substantially enlarged the areas of invention that are covered by the reporting requirement.

In its present form, the reporting requirement is not limited to the atomic weapons area, which, as we have noted, is the only area now excluded from the patent system. The requirement reaches out to include also all inventions or discoveries useful either in the "production" or in the "utilization" of either "special nuclear material or atomic energy." The purpose of this provision was described in the Joint Committee's legislative report as being "to keep the Commission fully and currently aware of all technology in the field of atomic energy."[37] In other words, no one is authorized to hold back from the Commission any new technological development which might be important in the planning or execution of the Commission's programs and other responsibilities. And what the act calls for in the report is "a complete description" of the invention or discovery.

It will be noted that the terms employed in the reporting provision have an extensive coverage, which would facilitate their being interpreted so as to accomplish their exceptionally broad purpose. Since most inventions in the field of atomic power development either will clearly fall within the scope of this reporting provision, or arguably might do so, it is worth considering, for a moment, what the effects of this important part of the act may be.

[34] By §153(h) of the act, 68 Stat. 945, 42 U.S.C.A. §2183(h) (Supp. 1954), the compulsory licensing provisions apply to any patent the application for which shall have been filed before September 1, 1959—in other words, inventions conceived during a period of approximately five years from the enactment of the 1954 act. The Senate had voted to make this period ten years, on the ground that five years would not provide a sufficiently long interim period (see 100 Cong. Rec. 12002-03 (1954)), but, on this point, yielded to the House. It should be noted, however, that under the act, the compulsory licensing provisions are applicable to such inventions during the entire seventeen-year life of the patent after the patent has been issued. Indeed, were it otherwise, the compulsory licensing provisions would be virtually meaningless: for one thing, the licensee then would have no assurance of being able to retain the license after the five-year period expired and hence he would hardly be justified in investing any capital on the strength of such a license; for another, the time lag in the Patent Office for prosecution of patent applications means that probably not a great many of the privately owned patents in the field should be expected to issue much before September 1, 1959, and, accordingly, the need for the compulsory licensing safeguard, with respect to such inventions, would be most likely to arise after September 1, 1959.

[35] See §11(a)(3), 60 Stat. 768, 42 U.S.C. §1811(a)(3) (1946).

[36] 68 Stat. 943, 42 U.S.C.A. §2118(c) (Supp. 1954).

[37] H.R. Rep. No. 2181, 83d Cong., 2d Sess. 25 (1954). The Commission itself described the purpose of the provision as follows: "By being fully apprised of private invention in this field, the Commission will be in a position to allocate its resources and funds where they are most needed. Without knowledge of private achievement avoidance of duplication of effort cannot be assured." See *Hearings, supra* note 18, at 598.

First, it should be made clear that section 151(c) gives to the inventor an election. Within the 90-day period, either he must file a patent application in the Patent Office or else he must file an invention report with the AEC, but he is not required to do both. Different considerations may influence his choice in particular cases, but if he is not prepared to undertake the expense and the trouble of filing a patent application, then he is under an affirmative duty to report the invention to the AEC. If he does elect to file a patent application, the invention, in due course, will presumably be made known to the AEC by the Commissioner of Patents, in view of section 151(d) of the act, which requires the Commissioner of Patents to notify the AEC and provide the AEC with access to all patent applications which, in the Commssioner's opinion, disclose inventions within the categories listed in the reporting requirements of section 151(c).[88]

Next, there is the question of computation of the 90-day reporting period. The act fixes the time as on or before the ninetieth day after whichever of two events is later—either the ninetieth day after "completion of such invention," or the ninetieth day after the inventor "first discovers or first has reason to believe" that the invention is useful in such production or utilization. This language is not substantially different from that in the 1946 act, but it raises a number of practical problems as to interpretation. For example, the meaning of the word "completion" is not fully self-explanatory and will have to be considered carefully in the light of all the circumstances of the particular case. Questions of this type have not yet come up for administrative or judicial decision under either the 1946 or the 1954 act. Until they do, the cautious approach will be to err on the side of filing the report or the patent application too soon rather than too late.

It is perfectly natural for a company or an individual working in this field to wonder what might be the consequences of not complying with the reporting requirements of section 151(c). As a matter of principle, of course, most people will want to be sure they are taking adequate steps for compliance, regardless of whether noncompliance might bring with it any serious legal consequences. Moreover, apart from legal consequences, there are the obvious problems as to good reputation and public relations, both of which could be adversely affected by noncompliance.

But the matter does not stop there. There are, in fact, some important legal consequences that need to be considered. One is expressly spelled out in the act, in connection with the statutory awards for inventions in the atomic energy field. Section 157(b)(3), dealing with eligibility for such awards, makes it a condition of eligibility that the applicant shall have complied with the provisions of section 151(c). Hence, an invention which has not been either filed in the Patent Office or reported to the AEC within the stipulated 90-day period could not be the subject of a statutory award. The AEC Patent Compensation Board has so held in a recent decision, stating that the reporting requirement is "a requirement which this Board may not waive or overlook."[88a]

[88] 68 STAT. 943, 42 U.S.C.A. §2183(d) (Supp. 1954).

[88a] See *In re* Grossman, Docket No. 17 (Oct. 25, 1955), reported in ATOMIC INDUSTRY REP. 235:641,

Another rather serious legal consequence might arise in connection with activities carried on pursuant to license or permit issued by the AEC. For example, the Commission's regulations provide that access permits, or facilities licenses, or licenses for distribution of special nuclear material shall all be subject to suspension or termination by the AEC for violation of or failure to observe any of the terms of the Atomic Energy Act of 1954 or Commission regulations.[39] Accordingly, failure to comply with the reporting requirements of section 151(c)—particularly if such failure were to be continuous and deliberate—could place in jeopardy an access permit or a license which the AEC has issued.

There is also the possibility that the validity of a patent eventually issued to cover the particular invention might be drawn in question if noncompliance with these reporting requirements could be established. This is a point which has not yet been litigated in patent suits involving the interpretation of either the 1946 or the 1954 Atomic Energy Act. Perhaps it will not be litigated for some time to come. But in the absence of a definitive adjudication, it would be hard to say with assurance that an inventor who fails to live up to the reporting requirements of section 151(c) may not also have thrown away his patent rights.

In addition, there is even the possibility that noncompliance with the reporting requirements of section 151(c) might be punishable criminally, if the Government were to establish beyond a reasonable doubt that the violation had been willful.[40]

Section 151(c) does not distinguish between inventions of great significance and inventions of small significance; it applies to every "invention or discovery" in the atomic energy field defined. Hence, the reporting requirements cannot safely be ignored merely on the ground that the invention does not measure up to whatever level of importance the company normally looks for when deciding to file and prosecute a patent application. Nor can information be withheld merely on the ground that it constitutes know-how or trade secrets which normally would be tightly held within the company; if such know-how or trade secrets embody an "invention or discovery" within the atomic energy field defined, then the invention or discovery is

235:643 (1955). The case on its facts involved the applicant's failure to comply with the reporting requirements of the 1946 act, but on this point, it is clear that there would have been no difference if the 1954 act had been involved.

[39] See the proposed regulations concerning Access to Restricted Data, §25.15, 20 FED. REG. 3635 (1955); Licensing of Production and Utilization Facilities, §50.100, *id.* at 2491; and Special Nuclear Material, §70.61(b), *id.* at 2494. It is to be expected that such provisions will be continued when the respective regulations are issued in final form.

[40] Section 223 of the 1954 act provides: "Whoever willfully violates, attempts to violate, or conspires to violate, any provision of this Act for which no penalty is specifically provided . . . shall, upon conviction thereof, be punished by a fine of not more than $5,000 or by imprisonment for not more than two years, or both. . . ." 68 STAT. 958, 42 U.S.C.A. §2273 (Supp. 1954). If this criminal penalty should be determined to be applicable to noncompliance with the reporting requirements of §151(c), then it would be important to consider in this connection the possible meanings and scope of the word "willfully," as here used. *Cf.* United States v. Murdock, 290 U.S. 389 (1933); Browder v. United States, 312 U.S. 335, 341-42 (1941); Spies v. United States, 317 U.S. 492 (1943); Screws v. United States, 325 U.S. 91, 101-07, 151-57 (1945).

plainly subject to the reporting requirements.[41] Moreover, the fact that the invention may be developed during the course of a contract with the Army, the Navy, the Air Force, or some other federal agency besides the AEC, and, hence, may be subject to a separate reporting requirement of the government agency which has let the contract, would not appear to justify or excuse noncompliance with section 151(c). In addition, nothing in the act appears to confer upon the Commission itself an authority to grant extension of time, and hence it is doubtful whether the Commission would be authorized to grant, by contract or otherwise, a period longer than the specified 90 days, even to its own contractors.[42]

All these considerations give to the reporting requirements a practical operating importance which, at first glance, might easily be overlooked. There is probably nothing about the reporting requirements which a well-managed business cannot live with in peace and harmony. But to do so requires careful planning and review, as well as a genuine desire to comply.

Contracts and Other Relationships with the AEC

Section 152 of the 1954 act has a title, "Inventions Conceived During Commission Contracts," which hardly suggests the mischievous and vexatious nature of its contents.[43] In the Congress, the legislative process does not always move with complete smoothness and efficiency—particularly toward the end of a long and controversial session. Section 152 evidences some of the weaknesses inherent in the legislative process, just as certain other portions of the act stand as monuments to its strength.

What Section 152 does by its terms is to vest in the Government, rather than in the inventor, the ownership of atomic energy inventions conceived under contracts, subcontracts, arrangements, or "other relationships" with the Commission, except to the extent that the Commission may waive such rights of the Government. That this is an unintentionally far-reaching and troublesome provision has now become apparent.

Perhaps the most important contributing factor to the section 152 difficulties was the fact that neither its provisions nor anything like them were in the bill at the time of the main public hearings held by the Joint Committee on Atomic Energy.

[41] It may well be, however, that if appropriate justification is furnished, the Commission will be prepared to maintain the confidentiality of trade secrets. *Cf.* §2.790 of the proposed AEC Rules of Practice, relating to requests for withholding documents from public inspection. 20 Fed. Reg. 5792 (1955).

[42] Section 161(q) of the 1954 act, 68 Stat. 948, 42 U.S.C.A. §2201(q) (Supp. 1954), confers on the Commission authority to "make, promulgate, issue, rescind, and amend such rules and regulations as may be necessary to carry out the purposes of this Act." It would not be easy to bring within that authorization a regulation which purported to relieve the inventor entirely of his obligation to make a report within the 90-day period which §151(c) specifically lays down. On the other hand, it might be within the Commission's authority to establish by regulation a system of short-form reporting, which called for filing within the 90-day period an initial short-form report that would later be amplified. A principal problem in connection with drafting any such regulation, however, would be to devise a short-form report which, nevertheless, met the statutory requirement that the report to be filed within the 90-day period should contain a "complete description" of the invention or discovery.

[43] 68 Stat. 944, 42 U.S.C.A. §2182 (Supp. 1954).

Thus, section 152 never had the benefit of the public comment and criticism which is so often indispensable in forging legislation that will be truly adequate to meet the problems of the day. What happened was that section 152 was put forward somewhat later, by those who were opposed to the compulsory licensing provisions, in the hope of persuading their colleagues in Congress that section 152 would make it unnecessary to include any compulsory licensing provisions whatsoever. The final result, however, was that instead of selecting between one or the other, the Congress included both sets of provisions in the act.[44]

After the act was passed, the detailed provisions of section 152 began to receive more intensive scrutiny. It has already become apparent that the language of section 152 is giving rise to problems of real magnitude. By its terms, the section is applicable to any invention useful in the production or utilization of special nuclear material or atomic energy if the invention is "made or conceived under any contract, subcontract, arrangement, or other relationship with the Commission, regardless of whether the contract or arrangement involved the expenditure of funds by the Commission." The section goes on to provide that in any such case, the invention "shall be deemed to have been made or conceived by the Commission"—in other words, to be government property rather than the private property of the inventor. The section then contains an exception on which very much hinges. The exception provides that the Commission "may waive its claim" to any such invention "if made or conceived by any person at or in connection with any laboratory under the jurisdiction of the Commission as provided in section 33,[45] or under such circumstances as the Commission may deem appropriate."

[44] The bills which served as the principal basis of the testimony given before the Joint Committee on Atomic Energy in the public hearings were H.R. 8862 and S. 3323, identical bills introduced on April 15, 1954, 83d Cong., 2d Sess. These bills contained neither compulsory licensing provisions nor anything resembling what later became §152. After the testimony from the public—though not from government agencies—had been virtually completed, there was prepared and circulated a committee print, dated May 21, 1954, incorporating numerous changes proposed at that time to be made in the bill. This committee print did not contain any compulsory licensing authorization, but it did contain what was a forerunner of the §152 finally incorporated in the act. This forerunner of §152 received rather critical comment from the Commission in testimony given on June 2, 1954. See *Hearings, supra* note 18, pt. 2, at 598-99. The bill as reported out by the Joint Committee on June 20, 1954 (H.R. 9757 and S. 3690) contained a limited compulsory licensing authorization but not a §152 provision. In that form, it passed the Senate as H.R. 9757, with certain amendments, on July 27, 1954. 100 Cong. Rec. 12242 (1954). Meanwhile, on July 26, 1954, the bill had been passed by the House, *id.* at 12024-26, after the House, on July 23, 1954, had accepted an amendment offered by Representative Cole which substituted the present §152 for the compulsory licensing provisions. *Id.* at 11721-29. Because of these and other differences between the Senate and the House, the bill went to conference. The first conference report, dated August 6, 1954, retained the §152 provisions, but in lieu of compulsory licensing, it sought to introduce a provision directing the Commission to give preferred consideration for §103 commercial licenses, during the next five years, to those applicants who agreed to make their patents available on a reasonable royalty basis to all other commission licensees who demonstrated need therefor. See H.R. Rep. No. 2639, 83d Cong., 2d Sess. 36, 48-49 (1954). This conference report was agreed to by the House, 100 Cong. Rec. 13787 (1954), but was rejected by the Senate. *Id.* at 14364. A second conference report, H.R. Rep. No. 2666, 83d Cong., 2d Sess. (1954), containing the provisions finally incorporated in the 1954 act, was then submitted to and accepted by both House and Senate. 100 Cong. Rec. 14852-73, 14603-06 (1954).

[45] Section 33, 68 Stat. 928, 42 U.S.C.A. §2053 (Supp. 1954), covers a special situation—probably of relatively minor importance with respect to the general patent aspects of this subject—where the Com-

This statutory language furnishes virtually no standards by way of guidance. The general purpose of the sponsors of this amendment appears to have been to put the Commission in a position where the Commission would be able to prevent firms from profiting in an inappropriate manner from their association with the government-financed atomic energy program.[46] Hence, the Commission is confronted with some very understandable difficulties in determining where it is "appropriate" to relinquish these important property rights which the act otherwise vests in the Government.[47] Moreover, when the breadth of the coverage is considered—"under any contract, subcontract, arrangement or other relationship with the Commission, regardless of whether the contract or arrangement involved the expenditure of funds by the Commission"—it would be possible to conclude that very few people might be able to own a patent in the field of atomic energy, except by leave of the Commission in the exercise of its discretionary waiver authority. Since the statute expressly provides that the use of federal funds by the inventor is not required in order to bring the relationship within section 152, the terms which the Congress put into this section would appear to have a reach that goes remarkably far.[48]

An obvious question is whether the sweeping language of section 152 would vest in the Government the inventions conceived by a research licensee operating under a section 104 research license from the Commission,[49] or those conceived by a commercial licensee operating under a section 103 commercial license from the Commission.[50] If so, it might appear that section 152 has succeeded in taking back almost the very thing that the other patent provisions of the act were designed to assure. Fortunately, there is some rather direct legislative history indicating that a mere licensee was not intended to be included.[51]

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mission carries on research for others in its own facilities because private facilities are inadequate for the purpose.

[46] In introducing the amendment, Representative Cole stated: "The amendment that I have proposed is to the effect that every application for a patent in this field must carry with it a sworn statement by the applicant telling the time and circumstances and conditions under which this invention or discovery was conceived, and if that information discloses that it was during the course of any employment by the Atomic Energy Commission or employment by a contractor of the Commission or in any relationship whatever with the Federal Government that then the Commission may deny to that applicant the right of a patent and declare that that patent is public property—based upon the argument that it was conceived in the course of an association with the Government which was supported by public funds. That to me accomplishes the objective. It prevents anybody at all—everybody whatsoever who has been engaged in this program from obtaining a patent in the nonmilitary field of atomic energy, if that invention or discovery was conceived during the course of any association or relation with the Government." 100 CONG. REC. 11722 (1954).

[47] In this connection, see also the testimony of William Mitchell, AEC General Counsel, in *Hearings before the Joint Committee on Atomic Energy on Development, Growth, and State of the Atomic Energy Industry*, 84th Cong., 2d Sess., pt. 1, at 194, 197-99 (1955).

[48] Section 152 also provides that, in the event of a controversy between the AEC and the inventor concerning whether the invention was "made or conceived in the course of, in connection with, or under the terms of any contract, subcontract, arrangement, or other relationship with the Commission entitling the Commission to take title to the application or the patent," then such controversy is to be determined by the Board of Patent Interferences, subject to appeal to the Court of Customs and Patent Appeals.

[49] See 68 STAT. 937, 42 U.S.C.A. §2134 (Supp. 1954).

[50] See 68 STAT. 936, 42 U.S.C.A. §2133 (Supp. 1954).

[51] During the debates, Representative Cole, then Chairman of the Joint Committee on Atomic Energy,

Even if this legislative history can safely be relied upon, however, it does not solve the problem of how much more—or, indeed, how little more—there need be before the licensee finds himself enmeshed in section 152. For example, in the ordinary course of arranging for a license from the Commission, consultations may take place between the prospective licensee and the Commission which result in suggestions from the Commission as to the most feasible means of carrying out the proposed project. Will the acceptance of such suggestions create an "arrangement, or other relationship" which catches him up in the section 152 net? Or if, after obtaining the license, the licensee later consults with the Commission concerning technical problems and decides to follow suggestions which the Commission makes, has section 152 then cast a cloud upon all his patent rights in the field? And will the Commission come to the conclusion—as it intimated early in 1955[52]—that a licensee who also has access to restricted data is thereby brought within the scope of section 152?

These are only a few of the types of problems which section 152 creates. Most assuredly, there are many more. Some of them, moreover, arise in connection with what would otherwise be regarded as the routine effort to meet procurement needs of the Commission and its contractors. How is a company in the atomic energy field to be able to know that—even if the reach of the terms "contract," "subcontract," and "arrangement" has been successfully avoided—it has still not become involved in some "other relationship with the Commission"? I am not unmindful of Judge Cardozo's caution that "overemphasis of certainty may carry us to the worship of an intolerable rigidity."[53] But surely here in section 152 we are confronted with a kind of harassing uncertainty that is without purpose or utility.

Mr. Ooms has indicated that anyone who writes a letter to the Commission may have to worry about whether he is in trouble under section 152.[54] This is perhaps an exaggeration, but unfortunately not a large one. And, equally unfortunately, the comment might also be applicable to certain types of letters one might write to a

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stated: "It is not intended that section 152 should cover licensees unless in some other respects they do have an association with the Commission by reason of being a contractor or subcontractor or having money given to them by the Commission. But the mere fact of a person having a license does not mean necessarily that the product of his operation, if a patent should flow, would become publicly owned.

"While section 152 clearly prohibits the granting of patents on any invention or discovery in the atomic field 'made or conceived under any contract, subcontract, arrangement, or other relationship with the Commission,' it would be necessary to strain this language to blanket within the prohibitions those persons whose sole relationship with the Commission is a license granted by the Commission or the use under license of some special nuclear material owned by the Commision." 100 Cong. Rec. 13783 (1954).

Senator Hickenlooper, then Vice Chairman of the Joint Committee, also stated: "It should be noted that this provision was not intended to apply to licensees of the Commission or to persons doing independent work, involving only a Commission security clearance, and not contractual arrangement." *Id.* at 14344.

[52] See testimony of William Mitchell, AEC General Counsel, on February 4, 1955, in *Hearings*, *supra* note 47, pt. 1, at 199-200.

[53] Benjamin N. Cardozo, The Growth of the Law 19 (1924).

[54] See Ooms, *supra* note 8, at 284-85.

commission contractor. Indeed, section 152 difficulties may sometimes be lurking in the most innocent kinds of telephone calls.[55]

There are two ways of trying to deal effectively with the host of problems created by section 152. One is the obvious suggestion that this section of the law might be promptly amended. If any statutory provisions at all are needed to deal with inventions conceived during commission contracts—and it is extremely doubtful that they are, particularly in view of the general success with which the AEC has administered the patent clauses in its contracts and subcontracts[56]—then section 152 could be amended so as to confine its scope to the essentials and, at the same time, clearly free from its threat those activities that ought not to be covered. But the prospect for an early legislative solution is not necessarily hopeful. The patent provisions of the act, it will be recalled, are among its most controversial features. Genuine difficulties might stand in the way of trying to open up section 152 without at the same time putting up for re-examination all the patent provisions of the act. And certainly, it would not be suprising to find in the Congress a disposition not to undertake any such general re-examination of the hard-fought patent provisions until more actual experience has been accumulated under the enactment of 1954.[57]

There is also available another remedy, and this one would not require legislative change. It does, however, call for boldness and clarity of action on the part of the Commission. The waiver power conferred upon the Commission by section 152 is, as we have seen, a very broad authority. The Commission "may waive its

[55] Section 152 also contains some rather complex and onerous procedural provisions which are intended to implement its substantive features. These procedural provisions are bound to create a number of problems for everyone, including particularly the Patent Office, but they are minor irritations as compared to the major substantive uncertainties that have been discussed.

[56] For a general description of the types of AEC patent clauses used in its contracts following the 1946 act, see AEC FIFTH SEMIANNUAL REP. 150 (1949); and also the testimony of William Mitchell, AEC General Counsel, in *Hearings, supra* note 47, pt. 1, at 193. The patent clauses undoubtedly will need some overhaul in the light of the purposes and provisions of the 1954 act; indeed, this by now may be somewhat overdue. But there is no ground for believing that the provisions of §152 would provide any assistance or helpful guidance for that overhaul. It should also be noted that §159 of the 1954 act expressly declares: "Nothing in this Act shall affect the right of the Commission to require that patents granted on inventions, made or conceived during the course of federally-financed research or operations, be assigned to the United States." 68 STAT. 948, 42 U.S.C.A. §2189 (Supp. 1954).

[57] At the time the compulsory licensing provisions were finally accepted by the House (see note 44 *supra*), Representative Cole stated that the Managers on the Part of the House were accepting the Senate's position on the understanding that the problem would be re-examined at the beginning of the next session of Congress. See 100 CONG. REC. 14871 (1954). Representative Cole did introduce a bill at the next session which would have repealed the compulsory licensing provisions, and would also have amended §152 so as to greatly restrict its scope and eliminate many of the troublesome problems that are here being discussed. See H.R. 5167, 84th Cong., 1st Sess. (1955). See also Cole, *Patenting Nuclear Developments*, Nucleonics, April 1955, pp. 31, 34, where Representative Cole states, with reference to §152, of which he himself was the sponsor: "Ironically, under the pressure of zealously trying to protect the normal American patent system, too much was written into this section." During the first session of the Eighty-fourth Congress, the Joint Committee on Atomic Energy did not take action on either H.R. 5167 or any other patent proposals. See also Representative Cole's address of September 22, 1955, where, in addition to reiterating his vigorous opposition to the compulsory licensing provisions, he said with reference to §152: "Unfortunately, there was insufficient opportunity for full discussion of this section and the past year has shown that this section needs to be revised." ATOMIC INDUSTRY REP. 51:86 (1955).

claim" under such circumstances as it "may deem appropriate." In connection with the Access Permit Program, the Commission has already determined that under section 152 it may properly exercise this waiver power in advance.[58] Had the Commission not done so in the case of the Access Permit Program, it is possible that the whole program would have faltered miserably. Similarly, the Commission appears to have it within its power—through regulation and general policy interpretations, as well as through rulings in particular cases presented—to determine in advance the general classes of cases in which the waiver power is to be exercised under section 152. This would probably involve a considerable administrative burden for the Commission. But that is a small price to pay for being relieved of the appalling uncertainties which section 152 will otherwise create. Somewhat in the alternative, the Commission could make a more general determination to waive the Government's rights under section 152 in all situations, except for specific cases where the Commission gives express notice in advance that this general waiver would not be deemed applicable. Thus, in one way or the other, it seems possible that the Commission itself, by heroic efforts, can overcome the unfortunate consequences of this poorly drafted section of the act.

[58] This is the Access Permit Program which is described in AEC EIGHTEENTH SEMIANNUAL REP. 102-03 (1955), and is discussed elsewhere in this symposium. See Green, *Information Control and Atomic Power Development*, *supra*, 91-112. In the access permits which are being issued, the Commission includes the following advance waiver:

"In issuing the Access Permit, the Commission hereby waives, under Section 152 of the Atomic Energy Act of 1954, (1) its rights in inventions or discoveries made or conceived in the course of, in connection with, or resulting from access to confidential restricted data provided under the terms of this Access Permit, and (2) its rights, except an irrevocable royalty-free, non-exclusive license for Governmental purposes, in inventions and discoveries made or conceived and which result from access to secret restricted data obtained in the course of, in connection with, or under the terms of this Access Permit."

Some Suggestions Relating to Patent Provisions in Atomic Energy Legislation To Protect the Public Interest

(By Casper W. Ooms)

SCOPE OF THIS PAPER

This paper attempts to make a brief analysis of the special problem of patents in atomic energy legislation. It will attempt first to examine what a patent is, and what its effects are in a free enterprise industry such as that in the United States of America. Next, the special aspects of atomic energy technology which dictate consideration of any special patent treatment will be reviewed. And finally, suggestions will be made for incorporating applicable principles into the atomic energy legislation to provide for any unique aspects which atomic energy legislation requires.

THE PATENT FOR INVENTION—WHAT IT IS

A patent for an invention is a grant by the Government to the patentee of the power to exclude others for a limited period from practicing the invention defined in the patent grant. The document consists essentially of two things, a description in such full terms as to enable in worker in the art to practice the invention, and the legal grant to the patentee of the right to exclude others from practicing that invention. The document is thus both a disclosure or description of a limited area of technology, and a grant of the power of the patentholder to exclude others from working in that limited area.

The grant of the power to exclude is given in exchange for the revelation by the patentee of the invention in order that when the limited period of the patent grant expires, the entire public may practice the invention and the great domain of publicly owned technology thus enriched for general and free use.

From the standpoint of the public at large, it is the disclosure or teaching that is important. From the standpoint of the patentholder, it is the grant of the power to exclude which is valuable. As will be demonstrated below, both of these aspects of the document are extremely important in a free enterprise industrial technology.

THE PATENT FOR INVENTION—WHAT IT DOES

The patent for invention has three important effects in industrial economy. These have been demonstrated as the justification for its use as a social device which has been accepted in most of the industrial countries of the world. These three aspects of the patent may be said briefly to be its incentive effect, its protective effect, and its effect as a breeder of innovation.

1. The patent—As an incentive

The first and foremost function of the patent is its usefulness in evoking a description or disclosure of what the patentee has invented in exchange for the grant of a patent. Some authors have considered the patent most useful as an actual incentive to invention, while others have put the emphasis on its usefulness in compelling the disclosure of inventions. Whether one or the other is more important

*Copy obtained upon request to Mr. Ooms. Also printed in 38 J. Pat. Off. Soc'y 38 (1956).

is of little consequence, as the existence of the patent system and its offer of a patent to an inventor in exchange for a disclosure of his teachings simultaneously evokes the invention and its publication. It can be readily demonstrated that the patent has been most effective as an incentive device to accomplish this purpose.

2. The protective power of a patent

Inasmuch as a patent for a short period monopolizes in the patentee a specified limited area of technology, that which the patentholder has invented, the patent enables that patentholder to protect himself against competition by others in the employment of that invention. This is the principal function of the patent as an economic device in a free enterprise competitive economy. It is to acquire this power of exclusion that patents are bought by others than the inventors. This patent frequently enables a small business to build an industry upon an invention and to protect itself in the difficult and costly period of development against more powerful competitors who have advantages of manufacture and distribution that are not usually possessed by the beginner company.

It is, of course, this restrictive power of the patent that leads to a great deal of demagogical discussion of monopoly as a creature of the patent. That a patent is a monopoly—a legal monopoly—is clear. However, it is usually a very limited monopoly of a very small area of technology and, as will be discussed in the next paragraph, actually may have the paradoxical effect of creating competition rather than diminishing it.

3. The patent as a breeder of innovation

One effect of the patent little discussed is its capacity to create increased competition. Because the patent is restrictive and enables the patent owner to exclude others from practicing the technique covered in the patent, any competitor who wishes to achieve the same result or employ the same invention may be blocked by the patent. If he cannot get into the area fenced in by the patent by a license, he must devise his own alternatives as good as or better than that covered by the patent. Thus the existence of the patent, with its power of restraint, actually compells others to attempt to duplicate or improve upon its teaching by alternatives. In the devising of these alternatives the entire technology is enriched.

Occasionally—but historically extremely infrequently—a single invention may appear that may actually have an extremely broad restraint, and embrace so large an area or an area so unique that it cannot be evaded. In that infrequent situation the patent will actually create a legal monopoly that may have appreciable social effects. The appearance of inventions of that magnitude and scope is so rare that in a maturing technology it can be generally ignored, but the fact that the possibility exists lead to special problems in the atomic energy field. These will be discussed below.

THE PATENT IS A WONDERFUL INVENTION

Actually, as a social device, the patent for invention is one of the greatest inventions contrived by man. It enables the public, by means of a device which costs the public merely a very nominal administrative cost, to offer to any inventor who may produce an inven-

tion and publish it for general use after a limited period, a patent empowering him to employ his own invention exclusively. The system exclusively puts the inventor to work to produce and publish inventions for no other consideration than the power and opportunity granted him by the patent solely to exploit the invention and to get his return from that invention in exchange for his having revealed it.

Some misapprehension has arisen that this enables the patent holder to impose some new tariff on the public. As a matter of fact, that concept is absolutely untrue and economically unsound. A patented invention must pay its own way. The patent holder cannot compel the public to buy the patented device or the product of the patented method in preference to other alternatives. The patented invention must possess some value which the public is willing to pay for. And only if this value is sufficiently great to attract the public to the use of the patented invention does the patentee get anything out of it.

Actually, the grant of a patent for an invention may result in the lowering of a price of a patented product or something produced by a patented method. Because the patent enables the patent holder to employ the technique alone, his tooling can frequently be more intensive, his economies of distribution may be greater, and competitive losses may be eliminated. There are a number of reasons why frequently a patented article goes into the market at lower cost because it is monopolized than it would go if it were made by a number of producers.

HISTORY HAS JUSTIFIED PATENTS FOR INVENTIONS AS AN ECONOMIC DEVICE

In spite of the regularity with which the patent system is assailed and the readiness with which the patent is attacked politically, the experience of every industrial nation has justified the patent system. In the United States the system has existed in almost its present form since the beginning of the Republic. In England it is older, and in many of the continental countries it is older. Only Holland of all (except Iron Curtain) countries has attempted to abolish the patent system, but after several years of experience without a patent system Holland reinstituted the patent system much like our own.

The sincerity and intensity with which the patent problem has been discussed in connection with atomic energy legislation discloses that American industry is deeply interested in having the patent system apply in as nearly a normal method as possible to atomic energy industry.

Obviously, if the patent system is good for industry generally it should be good for the atomic energy industry. If its principles are sound, they should all be applicable to an industry built in this field. And were there no unique aspects in the field of atomic energy, one could readily say no special patent provisions are required and the industry could be embraced within the normal patent system. In fact, there are special reasons why the patent will be of unique usefulness in the industry built upon atomic energy.

One fact that seems impressive at this time is that many of the early participants in the creation of an industry employing nuclear energy, will be investing enormous sums of money without the hope of immediate gains. Probably the only returns to many of these par-

ticipants in the early days of the industry will be the learning and the the inventions which they may contrive in this pioneer period. To the extent that this learning and these inventions may be covered by U.S. patents with a life of 17 years, this may enable some of the participants to get some return at a later period when the industry expands and the opportunities for the employment of these inventions become more general. Then the inventions can be exploited to the profit of those who, at great expense, may have made them years before.

In other words, the patents for inventions may be all that some of these early workers in the field get out of their investments and work. The opportunity to procure these patents and to exploit them profitably may be one great incentive that is bringing wide interest into the field of atomic energy.

THE UNIQUE NATURE OF ATOMIC ENERGY TECHNOLOGY

It is only because there are unique characteristics and special features of atomic energy technology and the industry to be built upon it that there is any justification for making exceptions from normal patent principles and procedures. That the atomic energy field does have some unique characteristics and peculiarities is evident from a number of factors:

1. The first 10 years of atomic energy development was at Government expense

One of the aspects of the development of atomic energy that is most frequently adverted to in the congressional hearings is the fact that almost the first 10 years of the development of atomic energy in this country was done wholly at public expense. This is only in part true. Although many billions of dollars were spent in this enterprise during the war years and the few years after the war, a large part of this money was spent for temporary war devices and the knowledge necessary to create them. Yet all of the expenditure for this purpose was not Government funds. Into this enterprise, especially during the war years, went the learning and effort and ingenuity of thousands of American scientists, inventors and industrialists, and the know-how and enterprise of thousands of American companies and organizations. This resource could not have been bought for sums many times greater than that which was actually spent. The atomic energy enterprise as developed by this Government during the war and immediately thereafter, was not something that was merely purchased with public money, but it was a project into which went all of the learning and ingenuity and inventiveness of a generation of American industry.

Because of this large public investment it is argued that unless some means be found to recover the cost of this learning in atomic energy, the Government will have been plundered by a "billion dollar giveaway." This is, of course, fantastic. In the first place, the best use that the public can make of the learning it has acquired in these early years of atomic energy enterprise is to make the knowledge acquired in this manner as widely and readily available as possible to enable those who work in this field to begin at the high plateau of development to which this early effort has brought us. Any patents that the Government may have acquired in this period are put to their best

use when the teachings in those patents are made generally and freely available.

2. The special political problems of atomic energy

Any industry built upon atomic energy is unique in one aspect with which industry generally is rarely touched, and that is the political impact of the industry upon the Nation and the world. Our first great problem with atomic energy was the maintenance of secrecy because of its military potential. While secrecy remains necessary in many aspects of the field, the complete secrecy in which the enterprise was first enshrouded becomes less and less important as time goes on and the spread between the accomplishments of the various nations is narrowed.

Nevertheless, atomic energy still has world political aspects quite apart from those involved in the design of military weapons. In a certain sense atomic energy has become symbolic of a national attitude toward peace. To the extent that any nation is willing to share its atomic energy technology and resources with the rest of the world is its good faith in world politics measured.

In addition, ever-increasing world power needs which are threatening a diminishing reservoir of fossil fuels make atomic energy power, and its development, one of the great pressing needs of the world. Further, the promising applications of atomic energy in medical learning techniques and in medical treatment, confer on it a singularly beneficent aspect. Also, the inquiries into the basic principles which govern nuclear phenomena have led to the most intensive and extensive attack upon the basic knowledge of the universe that has ever been attempted.

While all of these considerations do not bear directly upon the patent aspects of atomic energy and its domestication, they do indicate that we are dealing with a problem which has led to the most devoted and intense effort to create an industry in a brief period of time that the world has ever seen. In other words, we are not dealing here with the gradual evolution that has characterized industry generally, with a span of years between the dominating inventions and the belated public appreciation and demand for the product of the industry, but a technology that is maturing at a rate which has never before been encountered in the history of the world. That becomes important because it means that we are confronted with an immature technology in which there are many competing active participants, many of whom may stumble upon or create an invention of world-sweeping importance.

3. The intensity of effort that characterizes the atomic energy industry

One need but examine the releases of the Atomic Energy Commission from day to day to realize that the entire American industry is at work in this field. The release of the names of companies merely seeking access agreements indicates that this is not to be the special field of a few companies, but is the immediate interest of almost every organization engaged in industrial work in this country. Of course the interests of these various participants are diverse, but they all impinge upon one another at various points. Many of the common principles and common tools will be of interest to all participants.

WHY SHOULD THERE BE ANY SPECIAL PATENT PROVISIONS IN ATOMIC ENERGY LEGISLATION?

When the first Atomic Energy Act was passed, many of its provisions were dictated by the fact that the Government intended to maintain a monopoly of atomic energy for a period within which world control of this new agency was to be attempted. In order to enable the Government to participate in a universal approach to the question, it was necessary that many special provisions be put into the legislation which would insure that when the Government was called upon to act it could act freely and with complete control of the entire field. That first effort at universal control of atomic energy has failed, but the efforts being made at this time have changed in character and no longer have any serious effect upon the patent provisions of the legislation. What is important in the legislation is that the special relationship of the Government to this industry and the public's position in it still dictate some special provisions.

1. Need for reporting

As long as the Government maintains its very active program in atomic energy and acts as a clearinghouse for all the developments in the field, and of course has the special duties and burdens imposed by the problem of military weapons, it will remain essential that there be special provisions in the legislation requiring the reporting of atomic energy inventions. This is pretty well covered in the 1954 act. In the event there is a rewriting of any of these provisions, it might be profitable to gather together into a coherent single provision the requirements for reporting in section 151(c) and the specified penalties which the failure to report may impose. These at present are scattered throughout the act and some are merely implied.

2. Government-owned patents in atomic energy

Because of the very active work by the Government in the early years of atomic energy and its maintenance of an extremely comprehensive program for development by development contracts and its own facilities, the Government has acquired and will continue to acquire a great number of patents in this field which at the present time are licensed without royalty to American industry. Section 156 requires the Commission to establish standard specifications for the licenses to use Commission-owned patents, and these proposed standards have been prepared.

The question has been raised whether or not the Government should charge royalties for these inventions which are covered by patents owned by the Commission. There was a provision in the early drafts of the 1954 act which provided for the imposition of royalties upon licensees under these patents. On the one hand, it is contended that the Government has an enormous investment in these inventions and should take some steps to recoup this investment. On the other, it is urged that these patents are put to their best use when the teachings contained in them are made freely available for the widest possible utilization. The second position has always appealed to me as being the most profitable from the public standpoint. The existence of any licensing authority, even though the royalties be extremely reasonable, will involve an administrative burden that may actually cost more than the yield of the royalties.

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Those who urged that these patents should be licensed only at royalties also contended that the Government charges for many of its facilities, such as its grazing and mineral lands, and such properties of the Government as patents, cannot be distinguished. It must be remembered that grazing lands and mineral rights are unique in that a single licensee is the only one who can utilize those facilities or resources. If the Government should grant free access to them to a single citizen, there is obvious discrimination and preference and what is in effect a subsidy in a competitive industry. The inventions disclosed in patents, on the other hand, are not a resource which is exhausted by a single use but find their greatest public benefit if they are put to wide and ready use by a great number of people. The public benefit conferred by having the teachings in these patents available as part of the public domain will probably prove more profitable in the long run to the public at large than any device for exacting a small license fee for the employment of these inventions.

There is another reason why a licensing system for the employment of the inventions covered in these patents is not recommended. The United States traditionally has not sued for infringement of its patents. Since a license is merely a waiver of the right to sue, to make a licensing scheme effective, the Government must be prepared to sue all those who employ the teachings of its patents without license. This means that the Government must abandon its traditional policy of permitting the free use of its patents and be prepared to sue its own citizens for infringement. This is a fundamental change in policy that should be considered only for most compelling reasons. Those reasons do not appear in the atomic energy field.

One question is raised by the Government policy of permitting the free use of inventions covered by its patents; if the Government is to make all of the teachings it owns freely available, why should the Government seek patents upon these inventions? The seeking of the patent not only involves considerable administrative expense in prosecuting the patent application in the U.S. Patent Office, but it also frequently results in a delay in the dissemination of the information contained in the patents. There are, however, some problems that dictate that the United States may have to continue to seek patents for its inventions. In the first place, the patenting of the invention by a stranger to the Atomic Energy Commission may put the Commission at the disadvantage that although it actually had the teaching first, the patent would issue if the Commission did not file a patent application, to one who is not the first inventor. This would enable the patentee to subject practitioners of the invention to the patent domination even though the invention had been made by the Atomic Energy Commission or one of its contractors.

The Atomic Energy Act of 1954 has attempted to meet this problem by rendering a patent invalid (sec. 155) if prior knowledge existed even though that knowledge was under secrecy within the atomic energy program of the United States. That provision, which will be adverted to later herein, would protect the public against assertion of patent rights by one who was not the first inventor, and the statutory provision which protects all U.S. agencies against suit for infringement, would effectively protect the Commission itself against the assertion of patent rights by those who were later than the Commission in making the invention. This would not, however, meet another

problem that is raised in foreign countries. If the United States continues to seek patents in this country and also follows an extensive patenting program abroad, American industry will be protected in the use of such inventions in foreign countries. The entire problem of foreign patents raises many questions of its own which are not within the scope of this paper.

These considerations do dictate, however, that there be a reexamination of the policy of the Commission in procuring patents on the inventions it owns. Related to it is the Commission policy of seeking waivers from employees and employees of contractors, and in seeking patent clauses in contracts for developmental and other work for the Commission which require that the patents be turned over to the Commission.

Where the Commission enters into a contract in which it provides all of the funds and facilities for the development or promotion of the particular project, it is simple justice that all of the patent rights go to the Commission and thereby are thrown into the public domain so that the teachings are generally available without cost to the public. Where, however, the Commission enters into contracts with established workers in the field who not only provide facilities of their own but the know-how that is frequently unique to that industry, care should be exercised in seeking more for the Commission than merely the nonexclusive right to employ the inventions in Commission activities.

3. The compulsory licensing provisions of atomic energy legislation

Both in the 1946 act and in that of 1954 there have been provisions providing for a limited compulsory licensing of inventions in the atomic energy field. In both of these acts the inventions which were susceptible to compulsory licensing were only those which had met certain prescribed rigorous tests set forth in the statute so that the power to compel the licensing of these inventions was actually a reserve power which, up to this time, has never been exercised by the Commission. This series of provisions in the legislation has been subject to the greatest criticism and controversy, both outside of and in Congress.

On the one hand, it is argued that compulsory licensing is anathema to the American patent system and is a form of socialism which is not consonant with American free enterprise. It is sincerely argued that there is no place in atomic legislation for a compulsory licensing provision as it dilutes and impairs the incentives which the patent system affords. On the other hand, it is argued that all patents in atomic energy should be subject to some form of licensing because of the great investment which the United States has made in this industry. That argument is clearly fallacious as the contributions that will be embraced in future patents must be unique and individual contributions above the plateau of accomplishment which has marked the investment of the Government in this enterprise.

It is also argued that the possibility of the creation of a monopoly in this field is so great that compulsory licensing must be available in order to prevent the creation of a monopoly. There are special provisions in the act of 1954 (secs. 105, 158) directed to the prevention of the creation of a monopoly. Any monopoly created under a patent is obviously a legal monopoly and not within the reach of the antitrust laws if all that the patent holder does is exercise the rights

created by the patent. No patent of itself creates an illegal monopoly. It is only transactions and contracts or the combination of patents which create illegal monopolies. The possibility of any single patent arising which may create a monopoly in atomic energy because of the peculiarly dominating character of the patent is quite remote but nevertheless sufficiently real that as long as apprehension continues that this possibility may be realized, some provision should be made for it. A properly guarded and restricted provision to permit the Commission to exercise a reserve power of subjecting any dominating patent to compulsory licensing seems at this stage to be a necessary part of atomic energy legislation.

Another contention advanced for the maintenance of compulsory licensing provisions in atomic energy legislation is the fact that in the early period of the domestication of atomic energy the opportunity for access to the field will not be universal. In the first place, much of the work for the first 10 years of the program has been entrusted to a number of companies that will have, because of this early work, some advantage in the field in that they will have acquired the know-how and acquaintance with the problems of atomic energy that will enable them to take a leading position in the field. This is one of the inevitable consequences of pioneer work, but the patent policies of the Manhattan district and the Atomic Energy Commission have been such that all of the inventions made in this early period are covered by patents owned by the Commission and freely available to the public. That early participation in the work will probably enable these participants to acquire more inventions and more important inventions in the years to come is an assumption which may or may not be true. In many industries it is the outsider who, coming in with a fresh and novel approach, contributes the basic learning.

It is, in any event, impossible to equalize the opportunities in this field for every participant. There will neither be the material, the trained men, nor the facilities needed to give every participant in the field of the domestication of nuclear energy an opportunity to begin work at the same time and from the same position as the other participants. This cannot be corrected or equality established by penalizing the earliest participants and those who make the greatest number of innovations and inventions in the field. This is not the only area in American industry where ideal and absolute equality of opportunity does not exist. It cannot be corrected by any modification of the patent system without impairing the incentives which that system provides.

RECOMMENDATIONS

These considerations lead to these recommendations: In order for the patent system to be employed to the greatest benefit of the public interest in the advancement of atomic energy industry, the industry should be restored to the normal and conventional operation of the patent system to the fullest possible extent as soon as possible. Inasmuch as the patent system does not embrace all scientific contributions that may be of great value in this field but merely the categories of patentable invention enumerated in the Patent Act, it is desirable to maintain an award system that will enable the Patent Compensation Board of the Atomic Energy Commission to grant awards to contributors who cannot be rewarded under the patent system.

To insure that the patent system is given its fullest opportunity in this field, the patent clauses of Commission contracts and the administration thereof, as well as the waiver system followed by the Atomic Energy Commission, should be examined to insure that both individual workers in the field and contractors with the Commission have available to them the greatest opportunities which the patent system affords. It may be that the Commission at this time is following a policy which does reduce its demands to the fullest possible extent consistent with the public interest in those projects where only public money and facilities are employed, and if so this would of course satisfy this objective.

RECOMMENDED CHANGES IN PATENT PROVISIONS OF 1954 ATOMIC ENERGY ACT

Examining chapter 13 of the Atomic Energy Act of 1954 covering patents and inventions, the following recommendations and suggestions are made:

The present provisions of section 151, defining the proscription of patenting of inventions "useful solely in the utilization of special nuclear material or atomic energy in an atomic weapon" and revoking any patent rights in inventions to the extent that such inventions are so used (subject to just compensation), seem to be adequate to achieve the purpose. The advisability of permitting patents, which inherently are published disclosures, of military weapons is questioned. Many military weapons depend for their efficacy upon the element of surprise. Inasmuch as a government alone is theoretically interested in the manufacture and use of weapons, there would seem to be no reason for the granting of patents upon weapons as there are special statutory provisions to prevent the enforcement of such patents against the Government except to procure just compensation for the use of the inventions. A system of awards for the invention of weapons which would enable the inventor to keep secret the invention would appear to be preferred to any system of patenting.

The reporting provisions of section 151 (c and d) are satisfactory. It has been suggested that the penalties for failure to report which are contained in other provisions of the act should be brought together in closer proximity to the provision which requires reporting for clarity. This is not a serious defect in the legislation.

Section 152 creates a presumption that inventions in this field made by one who is under contract or has some other undefined relationship with the Commission are presumptively made by the Commission and prescribes a rather elaborate procedure for determination of the ownership of the invention. This section has been widely criticized, even by its own author. It is suggested that the rights to inventions conceived during Commission contracts are best determined by the terms of the contracts themselves and by the administration of the patent clauses which the Commission inserts in such contracts than by any statutory provision. The assignment of the determination of the ownership of such patent to the Board of Interference Examiners of the U.S. Patent Office rather than the courts appears to be a complication of legal procedure which is unnecessary. Inasmuch as any determination by the Board of Interference Examiners would be reviewable by the Courts, a determination by the

courts in the first instance would seem to be preferred. In the opinion of the writer, section 152 could be removed from the statute without any impairment.

Sections 153 and 154 set up a very elaborate procedure for the limited form of compulsory licensing which the statute attempts. This could be greatly simplified. The possibility that the Commission may sua sponte undertake to declare a patent to be affected with the public interest, seems sufficiently remote to eliminate that alternative and make all compulsory licensing to be subject to initiation by an applicant and subject to the same rigorous tests which are prescribed for the applicant in section 153(c), (d) and (e). The provisions should of course insure a hearing and should contain all of the protection which is prescribed in the section at the present time.

Section 154 seems to be unnecessary in view of the fact that the licensed use of the patent is never subject to injunction.

Section 155, making the inventions known to the workers within the atomic energy program, even though entirely secret, invalid if patented in a subsequently applied for patent, is contrary to the present patent system and introduces an innovation that seems entirely unnecessary. If the intention of the provision is to protect the United States against the assertion of patent rights to inventions which were known to the Commission but kept under secrecy, that could be accomplished by a simpler provision. Such a provision would merely make such knowledge a defense for the Commission and for the United States without actually invalidating the patent procured by the one who independently made the invention and, following the procedure prescribed by the patent system, procured a patent therefor. All the other statutory bars to patent validity which are prescribed in the U.S. Patent Act are dependent upon there actually having been reproducible public intelligence of the invention. This provision for the first time eliminates that aspect of notoriety and makes a secret use of the invention a defense to the validity of a patent.

Section 156 seems adequate for its purpose, as does section 157.

Section 158 is unnecessary as the courts have found that the misuse of the patent in a scheme of monopolization permits the court to subject such a patent to compulsory licensing. All that section 158 does is grant this permissive power to the court and require that the license so compelled shall be subject to a reasonable royalty fee, which has been the practice of all the courts but two in imposing compulsory licensing as a remedy for misuse of patents.

Sections 159 and 160 are adequate for their purposes although the period of time in which section 160 was to be effective has already expired except for the consequences to the patentee of any patent which was granted after reinstatement of an application under this section.

CHICAGO, *October 12, 1955.*

Patent Protection and Atomic Energy Legislation *

Stefan A. Riesenfeld **

I

THE PATENT PROVISIONS OF THE ATOMIC ENERGY ACT OF 1954

A. Background and Battleground

1. Genesis and Content of the Patent Provisions in the 1946 Act

When the release of atomic energy, whether by fission or fusion, ceased to be a purely military matter[1] and emerged as the most promising avenue for peaceful human progress, it became clear that a new and bold legislative policy governing the production and utilization of the new power source had to be shaped. It was felt that, at least at the beginning, the government would still have to bear the brunt of the development and retain vast monopoly and control powers in order to assure that scientific and technical endeavors would not slacken and that national security would not be imperiled; after a heated and crucial battle, it was settled that a new civilian agency should be the center of the new governmental activities.[2]

It soon became evident that the government's special position and responsibility in the atomic energy field would have important patent implications and require special regulation.[3] To be sure, the first bill on the control of atomic energy,[4] introduced by the late Senator McMahon, the pioneer of the new legislation, contained no mention of patent questions. But his second bill which was introduced shortly before the end of 1945[5] incorporated some important provisions to this effect.

The new bill singled out and differentiated two types of inventions: (1) those of "a device or method for the production, refining or other processing

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* Reprinted from 46 California Law Review 40–68 (1958).

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[1] About the military phase of the development of release and utilization of nuclear energy, see particularly SMYTH, ATOMIC ENERGY FOR MILITARY PURPOSES (1946).

[2] About the history of the first atomic energy legislation, see especially Miller, *A Law Is Passed—The Atomic Energy Act of 1946*, 15 U. CHI. L. REV. 799 (1948).

[3] About the handling of the patent aspects of inventions relating to atomic energy development during the military control phase, see Newman & Miller, *Patents and Atomic Energy*, 12 LAW & CONTEMP. PROB. 746 (1947).

[4] S. 1359, 79th Cong., 1st Sess. (1945).

[5] S. 1717, 79th Cong., 1st Sess. (Dec. 20, 1945). For the text of the bill see also Atomic Energy Act of 1946, *Hearings before Senate Special Committee on Atomic Energy on S. 1717*, 79th Cong., 2d Sess. 1 (1946).

of fissionable material" and (2) those of "any process or device utilizing or peculiarly necessary to the utilization of fissionable materials, or peculiarly necessary to the conduct of research or developmental activities in the [atomic] fields" (as specified in the bill). For the first class of inventions patents were to be issued or, if already issued, to be assigned to the Commission subject to a right to fair compensation of the inventor. The second class of inventions was left to privately-owned patents, but declared to be affected with a public interest and made generally available upon payment of a reasonable royalty fee.[6] In the course of the hearings on the bill before the Senate Special Committee on Atomic Energy[7] the proposed patent provisions drew a considerable amount of attention. Henry Wallace, then Secretary of Commerce, urged important changes in three respects.[8] In the first place he argued that the patent system had no raison d'être with respect to inventions in those fields of activity which the government reserved exclusively to itself. Second, he maintained that the government or the public at large should obtain patent rights to all other inventions stemming from publicly financed research. Lastly, he recommended certain restrictions of the compulsory licensing provisions. His arguments seem to have been persuasive to a large extent. As a result of them the Committee rewrote the patent provisions as well as most other sections of the bill and recommended its passage in its redrafted form.[9]

The new patent section, section 11 of the bill,[10] made a number of important structural changes in the existing patent system:

(1) Patent protection was withdrawn, both prospectively and retrospectively, for certain critical areas of technology and against certain privileged practices of inventions.

(a) Patentability was abolished *in toto* for inventions useful *solely* in the production of fissionable material or in the utilization of fissionable material or atomic energy for a military weapon.[11]

(b) Patent coverage was excluded for other inventions *to the extent that* they are used in the production of fissionable material or in the utilization of fissionable material or atomic energy for a military weapon.[12]

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[6] S. 1717, 79th Cong., 1st Sess., § 10. See also the summary given by one of the draftsmen of the bill, Miller, *A Law Is Passed—The Atomic Energy Act of 1946*, 15 U. CHI. L. REV. 799, 808 (1948).

[7] Atomic Energy Act of 1946, *Hearings before Senate Special Committee on Atomic Energy on S. 1717*, 79th Cong., 2d Sess. (5 parts) (1946).

[8] *Id.* at 225–26.

[9] Atomic Energy Act of 1946, S. REP. No. 1211, 79th Cong., 2d Sess. 1 (1946).

[10] *Id.* at 24.

[11] S. 1717 (Special Committee Draft), 79th Cong., 2d Sess., § 11(a)(1) (1946).

[12] *Id.* § 11(a)(2).

(c) Patent protection was likewise eliminated for other inventions *to the extent that* they are used in the conduct of research and development activities in certain atomic fields catalogued by the bill.[13]

(2) Broad powers of eminent domain were specifically accorded to the federal government, represented by an Atomic Energy Commission, with respect to inventions—whether or not covered by patents or pending applications—which are useful in the production of fissionable material or in the utilization of fissionable material or atomic energy for military weapons, or which utilize or are essential in the utilization of fissionable material or atomic energy.[14]

(3) The Commission was empowered to declare any patent, regardless of private ownership, to be affected with a public interest and as a result subject to certain broad but non-gratuitous licenses if the invention covered by the patent utilized, or was essential to the utilization of, fissionable material or atomic energy and, moreover, such licensing was necessary to effectuate the statutory policies and purposes. Such compulsory licenses authorized practicing of the invention in question, both by the Commission itself and by all private operators holding licenses to carry out the manufacturing or utilization activities subjected to such control by the bill.[15]

This triple regime of limited or non-patentability, government acquisition through condemnation and compulsory licensing was implemented by a congeries of provisions designed to assure prompt and adequate government information of inventions thus given a special status and to accord appropriate compensation or fair reward to persons affected by the new arrangement:

(1) The bill imposed a duty of prompt and complete disclosure on all makers of inventions useful in the production of fissionable material or in the utilization of fissionable material or atomic energy for military weapons.[16] In addition it obligated the Commissioner of Patents to notify the Atomic Energy Commission of all patent applications covering such or other inventions subject to the new powers of eminent domain.[17]

(2) In order to secure just compensation or reasonable royalty fees to patent owners subjected to withdrawal of acquired patent protection, condemnation and requisition, or compulsory licensing, as well as to provide fair rewards as an incentive to inventors affected by the exemptions from patentability, a special Patent Compensation Board to be designated by the Commission was created. The bill contained fairly detailed standards for

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[13] *Id.* § 11(b).
[14] *Id.* § 11(d).
[15] *Id.* § 11(c)(1) and (2).
[16] *Id.* § 11(a)(3).
[17] *Id.* § 11(d), last clause.

the determinations to be made by the board and provided for judicial review thereof upon petition by the aggrieved party.[18]

These provisions of the revised bill had smooth sailing in the Senate[19] but met with violent criticism in the House of Representatives[20] and were finally struck out and replaced by a different system proposed by Congressman Lanham.[21] However, they prevailed in the Conference[22] and were translated into law by the Atomic Energy Act of 1946.[23]

2. From the Atomic Energy Act of 1946 to the Revision of 1954

In spite of the turbulent circumstances of their birth and certain flaws in their draftsmanship the patent provisions of the 1946 Act did not hurl their administration into a chasm. The AEC went to work quietly and tackled its task methodically and with circumspection. In January 1947 it appointed a Patent Advisory Panel "to recommend to the Commission policies, procedures and staff organization for the effectuation of the patent provisions of the Act"[24] and, upon submission of its report on September 17, 1947[25] and after proper hearing, promulgated the administrative rules governing proceedings for compensation, royalty fees and incentive awards.[26] The Patent Compensation Board was appointed in April of 1949[27] and since that date has processed a dozen or so cases. A few of the applications

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[18] *Id.* §§ 11(e) and 13. For a discussion and construction of the judicial review provisions after they became law see Fletcher v. U.S. Atomic Energy Comm'n, 192 F.2d 29 (D.C. Cir. 1951).

[19] 92 CONG. REC. 6076–98 (1946).

[20] *Id.* at 9249–75, 9340–86, 9464–77, 9545–63 (1946).

[21] *Id.* at 9484–93, 9561 (1946).

[22] Atomic Energy Act of 1946, *Conference Report to Accompany S. 1717*, H.R. REP. No. 2670, 79th Cong., 2d Sess. 10–12 (1946).

[23] C. 724, §§ 11, 13, 60 STAT. 768, 772, 42 U.S.C.A. §§ 1811, 1813 (1952). For detailed discussions of the former law see especially Boskey, *Inventions and the Atom*, 50 COLUM. L. REV. 433 (1950); DAHL & BROWN, DOMESTIC CONTROL OF ATOMIC ENERGY 69 (Social Science Research Council Pamphlet No. 8 (1951); Newman & Miller, *Patents and Atomic Energy*, 12 LAW & CONTEMP. PROB. 746 (1947), reprinted in NEWMAN & MILLER, THE CONTROL OF ATOMIC ENERGY 142 (1948); Ooms, *Atomic Energy and U.S. Patent Policy*, 2 BULL. OF THE ATOMIC SCIENTISTS, No. 9 and 10, at 28, No. 11 and 12, at 30 (1946); Ooms, *The Patent Provisions of the Atomic Energy Act*, 15 U. CHI. L. REV. 822 (1948); Ooms, *Problems of Patent Policy for Government and Industry in Atomic Energy*, LECTURES ON ATOMIC ENERGY INDUSTRIAL AND LEGAL PROBLEMS 155 (U. of Mich. 1952); Note, *Atomic Energy Patent Provisions and the American Economy*, 97 U. PA. L. REV. 389 (1949).

[24] *AEC, First Semiannual Report*, S. Doc. No. 8, 80th Cong., 1st Sess. 10 (1947); *AEC, Second Semiannual Report*, S. Doc. No. 96, 80th Cong., 1st Sess. 17 (1947).

[25] *AEC, Third Semiannual Report*, S. Doc. No. 118, 80th Cong., 2d Sess. 35 (1948); AEC, FIFTH SEMIANNUAL REPORT 149 (1949).

[26] The regulations were published in the proposed form on May 8, 1948, 13 FED. REG. 2487 and promulgated in their final form on June 24, 1948, 13 FED. REG. 3457, 10 C.F.R. pt. 80 (1949); *cf.* AEC, FOURTH SEMIANNUAL REPORT 57 (1948); AEC, FIFTH SEMIANNUAL REPORT 149, 173 (1949).

[27] AEC, SIXTH SEMIANNUAL REPORT 14 (1949).

were terminated by sizable settlements,[28] one led to an award of $7,500 in favor of the applicant,[29] but the majority were rejected.[30]

The Commission saw no occasion to exercise its statutory authority to declare patents affected with public interest and thereby subject them to automatic licenses. Following the lines of action recommended by the initial report of the Patent Advisory Panel, the AEC looked at its authority in this respect as a "reserve power" to be exercised only "under certain rather exceptional circumstances."[31] The successful maintenance of this position rested principally upon the practice followed by the AEC of reserving to itself the right to take title to any invention made in the course of work under the research, development and operations contracts concluded by it and supported with public funds. In execution of this approach the Commission developed three types of patent clauses—designated "type A," "type B" and "type C"—which were inserted in the contracts according to what kind of work by the contractor was involved. Type A, the most sweeping and most commonly used, accorded the Commission the power to insist on acquisition of full patent rights, while types B and C left the contractor's rights as non-exclusive and sole licensee, respectively, in fields other than atomic energy.[32] Because of the rapidly mounting patent portfolio thus accumulating, in December 1949 the AEC initiated a program offering and

[28] Application of Christofilos ($10,000 settlement); Application of Giannini & Co., involving the basic Fermi-Pontecorvo patent for production of radioactive substances by means of neutron moderation ($300,000 settlement); Application of Seaborg, Kennedy, Wahl & Segre ($400,000 settlement). See AEC, FIFTEENTH SEMIANNUAL REPORT 52 (1954); AEC, EIGHTEENTH SEMIANNUAL REPORT 100 (1955); CCH ATOM. EN. LAW REP. ¶¶ 3152, 3160.

[29] *In re* McClellan, 91 U.S.P.Q. 278 (1951), CCH ATOM. EN. LAW REP. ¶ 3154; see also AEC, ELEVENTH SEMIANNUAL REPORT 44 (1952); Ooms, *Problems of Patent Policy for Government and Industry in Atomic Energy*, LECTURES ON ATOMIC ENERGY INDUSTRIAL AND LEGAL PROBLEMS 155, 185 (U. of Mich. 1952).

[30] In re Fletcher, 84 U.S.P.Q. 386 (1950), CCH ATOM. EN. LAW REP. ¶ 3151, *aff'd sub nom.* Fletcher v. AEC, 192 F.2d 29, 90 U.S.P.Q. 3 (D.C. Cir. 1951) [for a connected phase of the litigation see Fletcher v. United States, 133 Ct. Cl. 896, CCH ATOM. EN. LAW REP. ¶ 3303 (1956)]; In re Pacyna, 89 U.S.P.Q. 196, CCH ATOM. EN. LAW REP. ¶ 3153 (1951); In re Schulz, 94 U.S.P.Q. 124, CCH ATOM. EN. LAW REP. ¶ 3155 (1952); In re Fulmer, CCH ATOM. EN. LAW REP. ¶31 56 (1950); In re Matheson, CCH ATOM. EN. LAW REP. ¶ 3157 (1951); In re Lindequist, 88 U.S.P.Q. 264, CCH ATOM. EN. LAW REP. ¶ 3158 (1951); In re Rapp, 105 U.S.P. Q. 48, CCH ATOM. EN. LAW REP. ¶ 3159 (1955); In re Grossman, 107 U.S.P.Q. 181, CCH ATOM. EN. LAW REP. ¶ 3161 (1955) (*on remand by* D.C. Cir.) 111 U.S.P.Q. 388, CCH ATOM. EN. LAW REP. ¶ 3163 (1956), *aff'd sub nom.* Grossman v. United States, CCH ATOM. EN. LAW REP. ¶ 3305 (D.C. Cir. 1957); In re Dittenheimer, 109 U.S.P.Q. 259, CCH ATOM. EN. LAW REP. ¶ 3162 (1956).

[31] AEC, FIFTH SEMIANNUAL REPORT 148 (1949).

[32] For a brief summary of the content of the three types of patent clauses and the field of their application, see AEC, FIFTH SEMIANNUAL REPORT 150 (1949); DAHL & BROWN, DOMESTIC CONTROL OF ATOMIC ENERGY 73 (Social Science Research Council Pamphlet No. 8 (1951)). Inventions made in the course of work (not financed by the Commission) on or with radioactive isotope compounds obtained from the Commission were left to unrestricted private patent rights, AEC, FIFTH SEMIANNUAL REPORT 151 (1949).

freely granting licenses on a royalty-free, non-exclusive basis for patents acquired by it as a result of inventions made by AEC personnel or contractor employees on AEC work.[33] The AEC thus successfully avoided becoming embroiled in cumbersome controversies and the very few court decisions which were rendered[34] caused no special difficulties.

3. The Revision of 1954: New Tempest in a Teapot

Toward the end of 1952, at the latest, it became evident that the 1946 legislation no longer corresponded to the "nuclear realities"[35] of the times. The atomic energy monopoly of the United States had vanished in 1949 when the USSR exploded her first atomic bomb; the advances in the art of harnessing atomic energy for peaceful uses had been made at such a pace that the further development of the nuclear reactor program made broadened participation by private industry feasible and desirable, if not imperative. As a result a thorough overhauling of the 1946 Act could no longer be postponed.[36]

The immediate impetus to legislative action was given by a message of the President of February 17, 1954[37] which urged revision of the existing law so as to furnish—among other objectives in the international field—"improved procedures for the control and dissemination of atomic energy information" and "encouragement of broadened participation in the development of peacetime uses of atomic energy." In order to accomplish the

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[33] See AEC, EIGHTH SEMIANNUAL REPORT 209 (1950); AEC, TENTH SEMIANNUAL REPORT 63, 147 (1951); AEC, ELEVENTH SEMIANNUAL REPORT 44, 192 (1952); subsequent reports.

[34] Fletcher v. United States, 133 Ct. Cl. 896 (1956); Fletcher v. United States AEC, 192 F.2d 29 (D.C. Cir. 1951), *cert. denied*, 342 U.S. 914 (1952); Consolidated Engineering Corp. v. United States, 127 F. Supp. 558 (Ct. Cl.), *cert. denied*, 349 U.S. 939 (1955).

[35] Term used in *Message from the President, Transmitting Recommendations Relative to the Atomic Energy Act of 1946*, H.R. Doc. No. 328, 83d Cong., 2d Sess. (1954); 1 LEGISLATIVE HISTORY OF THE ATOMIC ENERGY ACT OF 1954, 45 (AEC 1955).

[36] The need for and the scope of new legislation were the subject of extensive public hearings held by the Joint Committee on Atomic Energy during June and July 1953, see *Atomic Power Development and Private Enterprise, Hearings before the Joint Committee on Atomic Energy*, 83d Cong., 1st Sess. (1953). Prior to these hearings the chairman of the Joint Committee and the chairman of its Reactor Development Subcommittee had informed the Atomic Energy Commission that they would like to receive a statement on atomic power policy and a program of private industrial participation for consideration by the Joint Committee in executive session, *id.* at 62. Pursuant to these requests the Commission on May 26, 1956, transmitted a policy statement on atomic power development which had been submitted to and approved by the National Security Council, *id.* at 1, 54. This policy statement which was formulated in six points was again presented at the first day of the public hearings, *id.* at 6–7. Point 4e called for "more liberal patent rights than are presently granted to outside groups as may seem appropriate to the Commission and consistent with existing law," *id.* at 7. The desirability of broadening the area of private patent rights was stressed by numerous witnesses at the hearings. Mr. Ooms, in particular, made detailed proposals in this respect which exerted important influence on the final form of the Act of 1954, *id.* at 457.

[37] Note 35 *supra*.

latter goal the message recommended a carefully guarded, but drastic, relaxation of the government monopoly in the areas of production and utilization of atomic energy, coupled with a corresponding expansion of the area in which private patents could be obtained. However, in order to forestall the unfair acquisition of patent monopolies by contractors already in the field it was suggested that authority to require licensing of patented inventions essential to the peacetime applications of atomic energy should be continued for a limited period, estimated at five years.[38]

In pursuance of this request the Joint Committee on Atomic Energy drafted a proposed act to amend the Atomic Energy Act of 1946 which was introduced in both Houses in April, 1954.[39] The envisaged revision restored to the patent system a large portion of the sector which the 1946 legislation had withdrawn. Inventions useful *solely* in the utilization of "special material"[40] or atomic energy in an atomic weapon remained unpatentable;[41] multiple application inventions were likewise not protectable by patents *to the extent* that they were *used* in such utilization.[42] The proposed amendment also retained the privileged status of research in the atomic fields.[43] The compulsory licensing provisions were eliminated and the powers of eminent domain and acquisition by purchase were restricted to inventions useful in the utilization of special material or atomic energy in an atomic weapon.[44] A new section required the establishment of standard specifications, including reasonable royalty fees, for the grant of permits to use Commission-held patents.[45] The Patent Compensation Board was to be abolished and with it the system of merit awards for the inventors of nonpatentable or not wholly patentable inventions.[46]

In the hearings[47] on the bill the proposed new patent regime was subjected to numerous criticisms as to draftsmanship and content. The testimony, especially that of Mr. Boskey, a former Deputy General Counsel of the AEC, and of spokesmen for the National Association of Manufacturers and the United States Chamber of Commerce, revealed the need for sev-

[38] H.R. Doc. No. 328, 83d Cong., 2d Sess. 7 (1954); 1 Legislative History of the Atomic Energy Act of 1954, 51 (AEC 1955).

[39] H.R. 8862, 83d Cong., 2d Sess. 1954); S. 3323, 83d Cong., 2d Sess. (1954). For the identical texts of the Committee Print and the two bills see 1 Legislative History of the Atomic Energy Act of 1954, 53–104, 105–255 (AEC 1955).

[40] "Special material" signified plutonium, uranium enriched in isotopes 233 or 235 and other materials determined to be special materials, H.R. 8862, 83d Cong., 2d Sess. § 11s (1954).

[41] H.R. 8862, 83d Cong., 2d Sess. (as originally introduced) § 151a (1954).

[42] *Id.* § 151b.

[43] *Id.* § 152.

[44] *Id.* § 153.

[45] *Id.* § 154.

[46] *Id.* § 155.

[47] *Hearings before the Joint Committee on Atomic Energy on S. 3323 and H.R. 8862,* 83d Cong., 2d Sess., 2 parts (1954).

eral clarifications and the advisability of changes in policy.[48] Mr. Boskey, in particular, advocated the re-introduction of the merit awards system for inventors in the field still excluded from patent protection or even under other deserving circumstances and, in conjunction therewith, the preservation of a separate adjudicatory body and of the right to counsel and judicial review. In addition he made a strong plea for the retention of a temporary system of compulsory licensing in consonance with the President's recommendations and urged a special savings clause to preserve rights accrued under the existing act. The spokesmen for the NAM objected with great vigor to the preservation of the limitation on patent rights with respect to research and developmental activities, emphasizing its discouraging effect on the manufacturer of laboratory equipment.[49] As a result of this testimony the Joint Committee on May 21, 1954, produced a revamped draft[50] which was subjected to further hearings.

The new form of the bill retained non-patentability with respect to the utilization of special *nuclear* material or atomic energy in an atomic weapon and the duty to communicate such inventions to the Commission or Patent Office.[51] The special patent status of research and developmental activities, as well as the special powers of condemnation and requisition, were eliminated. Instead, the revision accorded the Commission general powers to acquire patents by purchase[52] and, moreover, predicated the acquisition of patents for inventions useful in the production or utilization of special nuclear material either upon a sworn statement by the applicant "as to whether the invention described in the application was not made or conceived during the course of, in connection with, or under the terms of any contract, subcontract, arrangement or other relationship with the Commission, other than as licensee under this Act, . . ." or upon express consent by the Commission.[53] The new wording of the bill made it clear that the practice of granting royalty-free licenses on Commission-held patents could be continued[54] and introduced a broad merit awards system for inventors making discoveries useful in the production or utilization of special nuclear materials or atomic energy or used in the conduct of research or development fields covered by the act.[55] Lastly, it incorporated an express savings clause.[56]

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[48] *Id.* at 123–54, 359–74, 454–75.

[49] *Id.* at 459, 463.

[50] Committee Print of H.R. 8862, S. 3323, dated May 21, 1954, reproduced in 1 LEGISLATIVE HISTORY OF THE ATOMIC ENERGY ACT OF 1954, 257 (AEC 1955).

[51] H.R. 8862 (in form of Committee proposal, dated May 21, 1954) § 151.

[52] *Id.* § 161g.

[53] *Id.* § 152.

[54] *Id.* § 153.

[55] *Id.* § 154.

[56] *Id.* § 155.

The representatives of the AEC, when presenting their views on the new edition of the bill,[57] urged expansion of the statutory duty to report inventions to the Commission so as to embrace the whole area of production or utilization of special nuclear material and to restore the obligation of the Patent Office to notify the Commission of all applications in these fields.[58] They came out in favor of a limited and temporary compulsory licensing program like that recommended by the President's message[59] and, while endorsing the broadening of the award system, recommended retention of the Patent Compensation Board.[60] They advised against the deletion of the privileged status of research and developmental activities[61] and suggested express legislative recognition of the power to insert suitable patent clauses in the contractual arrangements with the Commission.[62]

As a result of this position and despite violent disagreement within the Joint Committee a further version of the bill and particularly of its patent provisions was drafted and, after introduction as S. 3690 and H.R. 9757, recommended for passage in the report of the Committee.[63] The new patent sections preserved the non-patentability of utilizations of special nuclear material or atomic energy *in atomic weapons*, but established a broad duty of notification with respect to *any* inventions useful in the production or any utilization of special nuclear material or atomic energy.[64] They incorporated an elaborate and carefully hedged system of compulsory compensable licensing of patents covering inventions having primary importance in the production or utilization of special nuclear material or atomic energy to be in force for a five-year period.[65] It was newly specified that anticipa-

[57] *Hearings before the Joint Committee on Atomic Energy on S. 3323 and H.R. 8862*, 83d Cong., 2d Sess., Part II, 561 *et seq.* (1954).

[58] *Id.* at 597, 598. The Commission felt that it could perform its steering functions in the course of development only if constantly apprised of private achievement.

[59] *Id.* at 598, 649–70. It may be worth noting that Commissioner Campbell in this connection criticized the principle of proposed § 152 which became the forerunner of the present provision having the same numbering. *Id.* at 598.

[60] *Id.* at 599, 679.

[61] *Id.* at 599. Commissioner Campbell observed that research on a patented invention would not constitute infringement within the meaning of the patent law, but that use of a patented invention in research would not be privileged. As to the first proposition see the doubts expressed in Bee, *Experimental Use as an Act of Patent Infringement*, 39 J. PAT. OFF. SOC'Y 357 (1957).

[62] *Id.* at 667.

[63] *Amending the Atomic Energy Act of 1946, as amended, and for other purposes*, S. REP. No. 1699, 83d Cong., 2d Sess. (1954), H.R. REP. No. 2181, 83d Cong., 2d Sess. (1954).

[64] H.R. 9757 and S. 3690, 83d Cong., 2d Sess. § 151a-d (1954).

[65] *Id.* §§ 152, 153. The system employed followed proposals made by Mr. Ooms in *Atomic Power Development and Private Enterprise, Hearings Before the Joint Committee on Atomic Energy*, 83d Cong., 2d Sess. 457 (1954), and eliminated the automatic licensing following from a declaration that a patent be affected with the public interest, requiring instead that each private applicant for license must demonstrate that such action is necessary to effectuate the policies and purposes of the act.

tion because of prior knowledge or use should not be denied because such knowledge or use was under secrecy within the atomic energy program.[66] Recognition was accorded to the power of the Commission to grant licenses on Commission-held patents pursuant to standard specifications[67] and to require that patents for inventions made or conceived during the course of federally financed research or operation be assigned to the United States.[68] Provision was made for the grant of reasonable royalty fees, just compensation or awards for inventors barred from compensation or royalty or otherwise meritorious after consideration by a Patent Compensation *Advisory* Board.[69] Finally, one of the sections contained a specific savings clause.[70] Some members of the Joint Committee, including its chairman, added detailed dissenting statements in the report on the bill[71] and thus set the stage for a lively and tenacious Congressional battle.

In the House of Representatives Mr. Cole, then chairman of the Joint Committee, registered an impassioned protest against the constitutionality and Americanism of compulsory licensing[72] and advocated an amendment giving the Commission the status of the originator of inventions useful in the production or utilization of special nuclear material or atomic energy if made or conceived under any contract, subcontract, arrangement or other relationship with the Commission. This change and the necessary conforming amendments were adopted.[73] Conversely, in the other chamber, Senator Kerr succeeded with a proposal extending the period of compulsory licensing from 5 to 10 years, restricting it at the same time to the non-exclusive type,[74] and Senators Langer and Johnston induced their colleagues to add a new provision, decreeing forfeiture to the federal government of a patent for inventions useful in the utilization or production of special nuclear material or atomic energy upon its owner having been found to have used the same intentionally for a violation of the antitrust laws.[75] Since the Senate refused to pass the House of Representatives approved version of

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[66] H.R. 9757 and S. 3690, 83d Cong., 2d Sess. § 154 (1954).

[67] *Id.* § 155.

[68] *Id.* § 157.

[69] *Id.* § 156. The Board was restyled as the Patent Compensation Board by subsequent Committee action and this amendment was accepted by both Houses, 100 CONG. REC. 10685, 10686, 11687 (1954).

[70] H.R. 9757 and S. 3690, 83d Cong., 2d Sess. § 158 (1954).

[71] S. REP. No. 1699, 83d Cong., 2d Sess. 95–99 (Cole and Van Zandt), 105–138, especially 126–130 (Holifield and Price) (1954); H.R. REP. No. 2181, 83d Cong., 2d Sess. 95–99, 105–138, especially 126–130 (1954).

[72] 100 CONG. REC. 11658, 11721 (1954); 100 CONG. REC. A 5356 (1954).

[73] *Id.* 11729.

[74] *Id.* 12002, 12003.

[75] *Id.* 11987, 12227, 12230, 12239, 12240.

[76] *Id.* 12242.

the bill[76] and the House disagreed with the Senate amendments[77] a conference was called. The conference committee decided to find a new approach to reconcile the divergent House and Senate patent policies and at the same time avoid outright compulsory licensing. The committee drafted a bill which retained the House provisions vesting inventor status in the AEC with respect to inventions useful in the production or utilization of special nuclear material or atomic energy if made or conceived under contract or other arrangement with the Commission and at the same time provided that applicants for commercial licenses should in the next five years be entitled to preferred consideration if they agreed to make their atomic energy patents available to all other licensees demonstrating need therefor and willing to pay reasonable royalty fees as determined by the Patent Compensation Board. In addition, certain changes were made in the language of the Langer-Johnston clause relating to antitrust violations.[78]

The Senate, however, rejected the conference report, at least in part, because of the absence of compulsory licensing provisions, and requested a further conference[79] which was agreed to by the House.[80] In the second conference, therefore, the committee members, in part reluctantly, agreed upon combining a five-year regime of compulsory licensing of the type insisted upon by the Senate with a system giving the AEC inventor status with respect to inventions in the atomic energy field conceived or made under arrangements with the Commission.[81] In this form the report was approved by both Houses[82] and the bill thus redrafted finally became the Atomic Energy Act of 1954.[83]

B. The Present Regime:

Wolves in Sheep's Clothing, Sheep in Wolves' Clothing or Just Sheep?

It is no surprise that the present system shows the marks of its tempestuous conception and its birth by compromise. Its complex contours are anything but clear-cut and its blurred lines defy all attempts to bring them into focus. As a result the controlling provisions have prompted a number

[77] *Id.* 12438.

[78] *Atomic Energy Act of 1954, Conference Report,* H.R. Rep. No. 2639, 83d Cong., 2d Sess. 27–30, 36, 48–49 (1954).

[79] 100 Cong. Rec. 14364 (1954).

[80] *Id.* 14628.

[81] *Atomic Energy Act of 1954, Conference Report,* H.R. Rep. No. 2666, 83d Cong., 2d Sess., 27–32, 50–51 (1954).

[82] 100 Cong. Rec. 14606 (Senate), 14873 (House) (1954).

[83] Pub. L. No. 703, 83d Cong., 2d Sess. (1954).

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of analyses and studies[84] and formed the object of numerous Congressional hearings and inquiries[85] as well as of amendatory bills.[86]

Basically the new sections may be classified as dealing with four interrelated areas: (1) Establishment of a threefold regime of Non-Patentability, Government Held Patents and Private Patents. (2) Temporary and potential subjection of private patents to compulsory licensing. (3) Provision for a subsidiary and supplementary system of compensatory or appreciatory awards. (4) Regulation of patent consequences of secret development and use and of antitrust violations.

We now turn to a consideration of these subjects.

1. Non-Patentability, Government Patents and Private Patents

Like Gaul the area of nuclear technology is divided into three parts: a zone of non-patentability, a zone of government patents, and a zone of private patent rights. The broad underlying reason for this arrangement, of course, is the fact that certain phases of nuclear technology, by reason both of the urgency of its development and the necessity for secrecy, are a closely guarded government monopoly and that other aspects still need active promotion and supervision by the government.

(a) Non-patentability of atomic weapon inventions. This sector covers the utilization of special nuclear material or atomic energy *in an atomic*

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[84] See especially Adams, *Atomic Energy: The Congressional Abandonment of Competition*, 55 COLUM. L. REV. 158, especially at 160–67 (1955); Beckett & Merriman, *Will the Patent Provisions of the Atomic Energy Act of 1954 Promote Progress or Stifle Invention?*, 23 GEO. WASH. L. REV. 195 (1954), reprinted, 37 J. PAT. OFF. SOC'Y 38 (1955); Boskey, *Patents Under the New Atomic Energy Act*, 36 J. PAT. OFF. SOC'Y 867 (1954); Boskey, *Some Patent Aspects of Atomic Power Development*, 21 LAW & CONTEMP. PROB. 113 (1956); Boskey, *Progress and Patents in Atomic Energy: The Military and the Civilian Uses*, 34 TEXAS L. REV. 867 (1956); Brownell, *Atomic Energy and Free Enterprise*, 1957 ANTITRUST LAW SYMPOSIUM 11 (CCH 1957); Cole, *Patenting Nuclear Developments*, 13 NUCLEONICS, No. 4, 31–35 (1955); Dunlavey, *Government Regulation of Atomic Energy*, 105 U. PA. L. REV. 295, especially at 334–42 (1957); Mackey, *Corporate Practice in the Atomic Field*, AMERICAN PATENT L. ASSOC. BULL. 348 (1957); Ooms, *Revisions of the Patent Provisions—Good or Bad*, NATIONAL INDUSTRIAL CONFERENCE BOARD, MINUTES OF 3D ANNUAL CONFERENCE ON ATOMIC ENERGY IN INDUSTRY 279 (1954); Ooms, *Some Suggestions Relating to the Patent Provisions in Atomic Energy Legislation to Protect the Public Interest*, 38 J. PAT. OFF. SOC'Y 38 (1956); *Patent Problems in Atomic Energy*, WORKSHOPS ON LEGAL PROBLEMS OF ATOMIC ENERGY, U. OF MICHIGAN LAW SCHOOL 85 (1956); Wiles, *The Atomic Energy Act of 1954*, AM. PAT. L. ASS'N BULL. 343 (1957).

[85] See especially annual hearings on *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 84th Cong., 1st Sess., 3 pts. (1955); *Hearings Before the Joint Committee on Atomic Energy*, 84th Cong., 2d Sess., 2 pts. (1956); *Hearings Before the Joint Committee on Atomic Energy*, 85th Cong., 1st Sess., 2 pts. and index (1957); see further *Peaceful Uses of Atomic Energy, Report of the Panel on the Impact of the Peaceful Uses of Atomic Energy to the Joint Committee on Atomic Energy*, 84th Cong., 2d Sess. (2 vols. 1956), especially vol. 1, at 145; vol. 2, at 657–73 and 712–16.

[86] See especially H.R. 5694, 85th Cong., 1st Sess. (1957) (so-called Cole Bill).

weapon. An invention which is *solely* useful in such manner is totally non-patentable subject matter;[87] an invention which also has other utilizations may enjoy patent protection, but the scope of this protection does not include the military use.[88] The rationale for this regulation is, of course, the fact that the production of atomic weapons is an exclusive government domain[89] and that, as under the 1946 Act,[90] it was thought futile to accord patent rights for inventions with respect to practices which are permitted only to the government.[91] Accordingly, as far as inventions possess also non-military utilizations they remain patentable; but it must be noted that such applications may nevertheless fall under the general secrecy provisions of the Patent Act[92] and therefore possess only deferred patentability.[93] Of course, whether a particular invention is "solely" useful for utilization in an atomic weapon may sometimes be difficult to decide and, in view of the needed secrecy, perhaps not capable of timely judicial determination.[94]

In order to keep the AEC informed of technological advances which may have military utilizations and require secrecy as well as to facilitate its role of acting as the nerve center in this branch of technology, the statute imposes upon the originator of an invention useful in the production or *any* utilization, whether in an atomic weapon or not, of special nuclear material or atomic energy the duty of making a timely report thereof to the AEC unless the invention is described in a patent application. If the latter is the case the Commissioner of Patents must notify the AEC.[95] According to available statistics, in 1956 the Patent Office reported 450 applications under this section, as compared with 135 in the previous year and 50 in

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[87] 68 STAT. 943 (1954), 42 U.S.C. § 2181(a) (Supp. IV 1957).

[88] *Ibid.*, 42 U.S.C. § 2181(b) (Supp. IV 1957).

[89] *Id.* at 936 (1954), 42 U.S.C. §§ 2121, 2122 (Supp. IV 1957).

[90] See *supra* text to notes 8, 11 and 12. See also Boskey, *Inventions and the Atom*, 50 COLUM. L. REV. 433, 435 (1950); Ooms, *The Patent Provisions of the Atomic Energy Act*, 15 U. CHI. L. REV. 822, 826 (1948).

[91] See also, Boskey, *Progress and Patents in Atomic Energy: The Military and the Civilian Uses*, 34 TEXAS L. REV. 867, 871 (1956); Boskey, *Some Patent Aspects of Atomic Power Development*, 21 LAW & CONTEMP. PROB. 113, 117 (1956); Ooms, *Some Suggestions Relating to Patent Provisions in Atomic Energy Legislation to Protect the Public Interest*, 38 J. PAT. OFF. SOC'Y 38, 55 (1956).

[92] 66 STAT. 805, 35 U.S.C. § 181 (1952).

[93] See also the statement by the AEC in *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 85th Cong., 1st Sess., pt. 1, 77, 109, 304 (1957).

[94] For similar problems formerly arising under § 11(a)(1) of the Act of 1946 see Ooms, *Problems of Patent Policy for Government and Industry in Atomic Energy*, LECTURES ON ATOMIC ENERGY INDUSTRIAL AND LEGAL PROBLEMS 155, 166 (U. of Mich. 1952).

[95] 68 STAT. 943 (1954), 42 U.S.C. § 2181(b) (Supp. IV 1957). The compliance with this provision is assured by *Rules of Practice in Patent Cases*, 37 C.F.R. § 1.14(c) (Supp. 1957); *cf.* Wiles, *The Atomic Energy Act of 1954*, AMERICAN PATENT L. ASSOC. BULL. 343, 345 (1957).

1954.[96] Of these applications 19 were subject to secrecy orders in effect on March 4, 1957.[97] Both the breadth and the vagueness as to scope and sanctions of this imposition on the inventor of a special duty to report have been severely criticized.[98] It would seem that, independently of contractual relations, a duty of the inventor to report directly to the AEC might well be confined to, at the most, inventions *useful* in the utilization in weapons.[99]

(b) Government patents. Unquestionably the rules governing the acquisition of patents by the government have proven to be the bêtes noirs of the flock. Apart from the innocuous authorization of obtaining patents through purchase,[100] two overlapping and seemingly inconsistent sections control the field; these are sections 152 and 159.

Section 159 specifies that "nothing in the Act shall affect the right of the Commission to require that patents granted on inventions made or conceived during the course of federally financed research or operation be assigned to the United States." As mentioned before,[101] this section was inserted into the Act for the purpose of rendering it clear that the dropping of the condemnation clause contained in the original Act did not signify that Congress rejected the practice of including the A, B, or C type of patent provisions in AEC contracts as developed under the 1946 regime. Under the first and most sweeping form of these clauses the contractor concedes to the Commission the sole power to determine (1) whether or not and where a patent application shall be filed for any invention made or conceived by the contractor or its employees under the contract and (2) what disposition shall take place of the title to and rights under any

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[96] See statement by AEC, *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 85th Cong., 1st Sess., pt. 1, 109, 305 (1957).

[97] *Id.* at 305.

[98] See especially Boskey, *Some Patent Aspects of Atomic Power Development*, 21 LAW & CONTEMP. PROB. 113, 123–26 (1956); *Patent Problems in Atomic Energy*, WORKSHOPS ON LEGAL PROBLEMS OF ATOMIC ENERGY 85, 89 (1956). But contrast Ooms, *Some Suggestions Relating to Patent Provisions in Atomic Energy Legislation to Protect the Public Interest*, 38 J. PAT. OFF. SOC'Y 38, 47, 56 (1956) (calling the reporting provisions "satisfactory"). One of the reasons advanced for the criticism rests on the computation of the period set for the reporting which is measured from the time either of the "completion" of the invention or when the inventor first realizes or has reason to believe that his invention is useful in the production or utilization of special nuclear material or atomic energy. Apparently "completion" signifies actual reduction to practice. Another disturbing doubt concerns the effects of non-compliance with the reporting duty on the validity of the patent (not otherwise proscribed or vested in the government), especially in an infringement suit.

[99] H.R. 5694, 85th Cong., 1st Sess. (1957), *supra* note 86, does not contemplate any changes in § 151(c) of the Act.

[100] 68 STAT. 949 (1954), 42 U.S.C. § 2201(g) (Supp. IV 1957).

[101] Text to note 62 *supra*.

application or patent that may result.[102] Under the other two versions of the clauses the contractor makes a similar arrangement but retains either "at least a non-exclusive, irrevocable, royalty-free license" or "at least a sole (except against the Government or its account), irrevocable, royalty-free license with the sole right to grant sublicenses" excluding, however, use in the production or utilization of special nuclear material or atomic energy.[103]

Section 152, contrariwise, goes much further and ordains in its first sentence that "any invention or discovery, useful in the production or utilization of special nuclear material or atomic energy, made or conceived under any contract, subcontract arrangement, or other relationship with the Commission, regardless of whether the contract or arrangement in-

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[102] The first two paragraphs of the type A clause read currently as follows: "(1) Whenever any invention or discovery is made or conceived by the Contractor or its employees in the course of, in connection with, or under the terms of this contract, the Contractor shall furnish the Commission with complete information thereon; and the Commission shall have the sole power to determine whether or not and where a patent application shall be filed, and to determine the disposition of the title to and rights under any application or patent that may result. The judgment of the Commission on these matters shall be accepted as final, and the Contractor, for itself and for its employees, agrees that the inventor or inventors will execute all documents and do all things necessary and proper to carry out the judgment of the Commission. (2) No claim for pecuniary award or compensation under the provisions of the Atomic Energy Acts of 1946 and 1956 shall be asserted by the Contractor or its employees with respect to any invention or discovery made or conceived in the course of, in connection with, or under the terms of this contract." The remaining two paragraphs obligate the contractor to insert corresponding provisions in his employment or subcontracting agreements. See AEC MANUAL, c. 9113, § 013 (as revised June 20, 1955), reprinted, CCH ATOM. EN. LAW REP. ¶ 3405. This type of clause is employed "when the work to be performed or the material or equipment to be furnished by the contractor is of such character that any inventions or discoveries that may be made probably will relate directly to or concern some phase of the research or development work which AEC conducts or sponsors." *Ibid.* For the development of the wording of the clause see also the communication of the AEC to the McKinney Panel, *Peaceful Uses of Atomic Energy, Report of the Panel on the Impact of the Peaceful Uses of Atomic Energy to the Joint Committee on Atomic Energy*, 84th Cong., 2d Sess., vol. 2, 672 (1956).

[103] AEC MANUAL, c. 9113, §§ 014, 015 (1955), reprinted in CCH ATOM. EN. LAW REP. ¶¶ 3406 and 3407. These types of clauses are used when the work to be performed or the material or equipment to be furnished by the contractor is of such character that any inventions or discoveries that may be made probably (a) will relate only incidentally (and not directly) to some phase of the basic research or development work which AEC conducts or sponsors, but (b) will relate to a field of work in which the contractor has an established industrial and patent position, type C being employed if such invention or discovery, in addition, results from routine development or production work by the contractor. Finally the Commission has developed a special "C+ type" of clause for use in power study, access, and some commercial agreements. This clause gives the contractor an exclusive (except against the government), irrevocable, royalty-free license for uses other than in the production or utilization of special nuclear materials or atomic energy and a non-exclusive, irrevocable, royalty-free license for the latter uses; see statement by the General Counsel of the Commission in *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 84th Cong., 1st Sess. 193 (1955).

volved the expenditure of funds by the Commission, shall be deemed to have been made or conceived by the Commission, except that the Commission may waive its claim to any such invention or discovery, if made or conceived by any person at or in connection with any laboratory under the jurisdiction of the Commission . . . or under such other circumstances as the Commission may deem appropriate." The provision thus made is implemented by a statutory duty of disclosure and elaborate rules regulating the determination of controversies about the circumstances of particular inventions.[104]

There is no doubt that the substantive part of the section grossly overshoots the mark in many directions,[105] though luckily tempered by the somewhat unguided permission of discretionary administrative waivers.[106] Certainly its sweeping disregard of the time-honored inventor principle is of questionable wisdom and leads to all kinds of unnecessary complications and inconsistencies with other patent law rules and practices. It is one of the real ironies of fate that this constitutionally dubious[107] and, at any rate, uncalled-for departure from one of the basic tenets of American patent law was railroaded into the Act by its unwary author[108] in order to combat

[104] 68 STAT. 944 (1954), 42 U.S.C. § 2182, para. 1, second and third sentences, para. 2 and para. 3 (Supp. IV 1957). The duty must be performed by filing the requisite report either together with *any* patent application for an invention useful in the production or utilization of special nuclear material or atomic energy, or within thirty days after request by the Commissioner of Patents. The Commissioner must thereafter forward the information to the AEC. Again the question arises whether omission to file such report vitiates the patent if issued despite such failure even where no contract is actually involved, especially in view of the language: "no patent . . . shall be issued . . . ." For a discusion of the scope of the duty under § 152 of the act and the Patent Office procedure pertaining thereto see Wiles, *The Atomic Energy Act of 1954*, AMERICAN PATENT L. ASSOC. BULL. 343, 346 (1957). According to a statement by the AEC in March 1957, the Patent Office during 1956 made about 30 referrals under § 152, see *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 85th Cong., 1st Sess., pt. 1, 305 (1957).

[105] See especially the comments by Boskey, *Some Patent Aspects of Atomic Power Development*, 21 LAW & CONTEMP. PROB. 113, 126, 131 (1956); Cole, *Patenting Nuclear Developments*, 13 NUCLEONICS No. 4 at 31, 34 (1955). As the latter author points out in these comments, all that was intended was to provide for "a *procedural device* for giving the Commission ready title to those patents *to which it is entitled*." (Emphasis added.)

[106] "Since January 1956, the Commission issued waivers of rights under Section 152 of the Act of 1954 as respects three general categories: (1) Inventions and discoveries made or conceived as a result of access to restricted data (the waiver was incorporated in Part 25 of Title 10, C.F.R., Section 25.3 . . .); (2) Licenses issued by the Commission (the Opinion of the General Counsel was published as an interpretation in Title 10, C.F.R., Part 8 . . .); and (3) Inventions and discoveries made as a result of use of materials sold, distributed or leased, or otherwise made available, including radioactive and stable isotopes and services sold or otherwise made available including irradiation services (Final rules were published . . . as Part 83 of Title 10, C.F.R. . . .)" AEC, TWENTY-FIRST SEMIANNUAL REPORT 105 (1957).

[107] See the observations by Cole in *Patenting Nuclear Developments*, 13 NUCLEONICS, Nos. 4, 31, 34 (1955).

[108] (Then) Representative Cole himself admitted in 1955: "Ironically under the pressure of zealously trying to protect the normal American patent system, too much was written into this section." *Id.* at 34.

the purported un-Americanism of compulsory licensing—incidentally also without awareness that a recommendation to the same effect by Secretary Wallace at the framing of the first Act[109] had not found acceptance by the drafters.

Although seemingly couched in the terms of a presumption the true import of the section is as a rule of law[110] which covers all inventions *useful* in the production or utilization of special nuclear material or atomic energy —a very broad category—and therefore actually would leave little, if any, room for the operation of the contract patent clauses; this is especially true if one should conclude that the waivers authorized by the Act are indicated mainly by reason of the tenuousness of contact with the government in the making of the invention.[111] Although up to date no particular difficulties have arisen in the administration of section 152,[112] there seems to be no escape from the fact that troubles and embarrassment are bound to arise, once government inventorship by statutory fiat is taken literally. Its pernicious effects are especially apparent when it comes to the taking out of foreign patents for American inventions and in this respect serious complaints and justified anxieties have been voiced.[113] To be sure, the AEC has alleviated the situation by permitting Commission contract inventions to be made the subject of foreign patent applications if the contractor so

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[109] See text to note 8 *supra*.

[110] That facet is apparently overlooked by Ooms, *Some Suggestions Relating to Patent Provisions in Atomic Energy Legislation to Protect the Public Interest*, 38 J. PAT. OFF. SOC'Y 38, 56 (1956).

[111] See the comments to that effect by Representative Cole in *Patenting Nuclear Developments*, 13 NUCLEONICS No. 4, at 34 (1955). In 1955 (then) General Counsel Mitchell complained bitterly about the lack of statutory standards for determining when it is "appropriate" to waive the property rights which the act vests in the government, *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 84th Cong., 1st Sess., pt. 1, at 194 (1955). It should, however, also be noted, that Mr. Mitchell testified on the same occasion: "To the extent that the Commission would be entitled, under section 152 of the Act, to any invention or discovery the rights to which are retained by the contractor under the various types of clauses mentioned above, the Commission has determined *that it is appropriate under the statute to waive its rights to any such invention or discovery.*" *Id.* at 193 (Emphasis added).

[112] As mentioned, *supra* note 104, during 1956 about 30 patent application referrals were made under section 152, and as to these the Commission did not file any directive under section 152, para. 2. According to information by the AEC there were several instances where the Commission asserted rights in such cases, but after investigation and review the assignees concurred in the Commission's indicated rights so that there was no occasion to file any directive with the Commissioner of Patents. At present there are several cases under review. *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 85th Cong., 1st Sess., pt. 1, 305 (1957).

[113] See, *e.g.*, the testimony by Mr. Starr before the Joint Committee on Atomic Energy, *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 85th Cong., 1st Sess., 203, 211, 302 (1957).

desires and the invention does not involve classified matter.[114] But while this practice might be consonant with section 159 of the act, its harmony with the automatic vesting provision of section 152 is not so free from doubt and may easily discourage foreign filing by the contractor. Moreover, the reaction of the other patent laws to inventions "deemed to be made" by a foreign government agency remains to be seen, after the existence of the pertinent clause becomes known abroad. Certainly the first sentence of section 152 fulfills no valid function and ought to be removed from the statute with dispatch. One of the objectives of H.R. 600, introduced early in January 1957 by Representative Cole,[115] accomplishes this result and to that extent deserves and has found general approval.[116]

It may perhaps be legitimate to ask what purposes are served by the government's securing patent protection for inventions, if at the same time it embarks upon a program of making the practice thereof available to all interested parties without charge,[117] rather than merely insisting that the inventions in question be dedicated to the public. The answer lies in certain managerial and strategic advantages gained by patenting even under such circumstances. As a patentee the government is in a stronger position to protect the invention against usurpation by a subsequent claimant, to give its licensees a greater assurance of freedom from infringement actions, and to retain information about and, if necessary, control over the extent to which the public is served by the process, product or device in question.[118]

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[114] See the statements of the AEC in that respect in the AEC, TWENTY-FIRST SEMIANNUAL REPORT 105 (1957) and in *Hearings Before the Joint Committee on Atomic Energy*, 85th Cong., 1st Sess. 301 (1957); but note that the General Counsel intimated at the hearings that the patent issuing upon such foreign application covering a Commission contract invention might not inure to the sole benefit of the contractor but would be held in trust for all U.S. concerns(!). See also, AEC MANUAL, c. 9113, § 0113 (1955).

[115] H.R. 600, 85th Cong., 1st Sess. (1957). The same amendment was proposed in the more comprehensive bill H.R. 5694, 85th Cong., 1st Sess. (1957), also introduced by Mr. Cole.

[116] See, *e.g.*, the testimony in *Hearings Before the Joint Committee on Atomic Energy*, 85th Cong., 1st Sess. 240 (Chairman of the Atomic Energy Committee of the New York Patent Law Association), 550 (Vice-chairman of Committee on Patents of N.A.M.) (1957).

[117] The AEC embarked on its program of granting non-exclusive royalty-free licenses to Commission-held patents at the end of 1949, see text to note 33 *supra*. In January 1957 the Commission reported that some 1100 patents had been made available in that fashion and that about 580 such licenses had been granted, AEC, TWENTY-FIRST SEMIANNUAL REPORT 104 (1957). The first list of patents offered for licensing was published in the AEC, TENTH SEMIANNUAL REPORT 147 (1951); supplementary lists have been published from time to time in various subsequent semiannual reports.

[118] The technical advantages flowing from patenting and general licensing as compared with dedication are discussed in detail in 1 INVESTIGATION OF GOVERNMENT PATENT PRACTICES AND POLICIES, REPORT AND RECOMMENDATIONS OF THE ATTORNEY GENERAL TO THE PRESIDENT 126–30 (1947); FORMAN, PATENTS, THEIR OWNERSHIP AND ADMINISTRATION BY THE UNITED STATES GOVERNMENT 41 (1957); Saragovitz, *Procurement of Patents by Government Agencies*, 37 J. PAT. OFF. SOC'Y 677 (1955); see also the testimony by Captain Lavender, *Hearings Before Senate Special Committee on Atomic Energy on S. 1717*, 79th Cong., 2d Sess. 345 (1946), discussed by Newman & Miller, *Patents and Atomic Energy*, 12 LAW & CONTEMP. PROB. 746, 747 (1947).

As a result it makes good sense to have, in addition to the areas of nonpatentability and of private patents, an intermediate zone of government patent rights, especially where the particular inventions are made possible directly or indirectly, in whole or to a substantial extent through public expenditures. Unfortunately the details defy a hard and fast definition. Section 159, while based upon a sound policy, appears to be both too narrow and too rigid in its formulation. The AEC ought to be vested with untrammeled power to make such arrangements concerning rights to and under patents as are fair and equitable in the light of actual contributions made by the government and by the contractor.[119]

2. *Compulsory Licensing*

Comparatively little needs to be said at this date about the "prolix," "unduly cumbersome" and "extremely limited" provisions[120] pertaining to compulsory licensing of private patents covering inventions of *"primary"* importance in the production or utilization of special nuclear material or atomic energy.[121] As has been discussed before, the sections in question were inserted into the act in order to make sure that the dissipation of the government monopoly in the atomic power field would not enable a few big corporations that had acquired a vast body of experience as recipients of government funds to use their position in the race to build up an impenetrable patent monopoly in the field. Actually the act envisages two alternative avenues for such compulsory licenses, one being opened by the Commission on its own initiative through a formal declaration that a patent for an invention of the critical type is affected with the public interest,[122] the other being pursuable without such preliminary Commission action by any

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[119] For a good general discussion of the problem of patent rights of government contractors at the close of World War II, see Kreeger, *The Control of Patent Rights Resulting from Federal Research*, 12 LAW & CONTEMP. PROB. 714, 734–45 (1947); INVESTIGATION OF GOVERNMENT PATENT PRACTICES AND POLICIES, REPORT AND RECOMMENDATIONS OF THE ATTORNEY GENERAL TO THE PRESIDENT (3 vols. 1947). The current patent clauses in Defense Department and Army Department experimental, developmental or research contracts not relating to atomic energy are governed by 32 C.F.R. §§ 9.107–1, 598.107–1, which leave title to the invention with the contractor, see the discussion by Hodges, *Patent Policies and Procedures of the Department of the Army*, 39 J. PAT. OFF. SOC'Y 192, 204 (1957). The rules applicable to patent clauses in such contracts relating to atomic energy are 32 C.F.R. § 9.107–1, as amended, 22 FED. REG. 6325 (1957), and 32 C.F.R. § 598.107–2. For the patent provisions in research grants and other research arrangements by the Department of Health, Education and Welfare, see 45 C.F.R. pt. 8 (Supp. 1957).

[120] Characterization given to the section by Representatives Holifield and Price in S. REP. No. 1699 on S. 3690, 83d Cong., 2d Sess. 127 (1954) and H.R. REP. No. 2181 on H.R. 9757, 83d Cong., 2d Sess. 127 (1954).

[121] 68 STAT. 945 (1954), 42 U.S.C. § 2183 (Supp. IV 1957); 68 STAT. 946 (1954), 42 U.S.C. § 2184 (Supp. IV 1957).

[122] 68 STAT. 945 (1954), 42 U.S.C. § 2183(a) and (b) (Supp. IV 1957).

applicant for or holder of a license, permit, lease or authorization under the act.[123]

It seems to be almost inexplicable that this system precipitated such a truly quixotic attack in Congress and prompted such an effusion of words and ink. Its prospects for ever being invoked are dim indeed. In the first place, the whole matter is merely transitional in that it covers only patents applied for prior to September 1, 1959, although it does affect such patents for their whole seventeen years' life after their eventual issuance.[124] In the second place, the officials of the Commission are on record that, as under the 1946 Act, they look at the compulsory licensing provisions merely as a "reserve power" not to be actuated "except under compelling circumstances."[125] As a matter of fact the Commission has no practical reason to resort to compulsory licensing for the purpose of serving its own exigencies[126] as it and its contractors are sufficiently protected under a general provision which in effect restricts a patent owner to a claim for reasonable royalty fee against the government whenever an invention is used or manufactured by the United States, or for it by a contractor, subcontractor or other authorized person.[127] There is likewise little ground to surmise that private industry will invoke these procedures to an appreciable extent and with success. The experience under foreign laws seems to demonstrate the contrary. For example, in Germany, a most important industrial nation which has had compulsory licensing in the public interest as a feature of its general patent system since 1911,[128] only twenty such applications were granted in the period between 1920 and 1935, and none were affirmatively determined since the restoration of the patent system in 1950.[129]

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[123] 68 STAT. 945 (1954), 42 U.S.C. § 2183(c)-(e) (Supp. IV 1957).

[124] 68 STAT. 945 (1954), 42 U.S.C. § 2183(h) (Supp. IV 1957).

[125] *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 84th Cong., 1st Sess. 194 (1955).

[126] A declaration that a patent of the specified type is affected with the public interest vests the Commission with an automatic license to practice the invention, 68 STAT. 945 (1954), 42 U.S.C. § 2183(b)(1) (Supp. IV 1957).

[127] 62 STAT. 941 (1948), 28 U.S.C. § 1498 paras. 1 and 2 (1952). The provisions in question are based on the statute of July 1, 1918, 40 STAT. 705 (construed in Richmond Screw Anchor Co. v. United States, 275 U.S. 331 (1928)) and on a supplementary act of Oct. 31, 1942, c. 634, § 6, 56 STAT. 1014. The latter section was transferred to 28 U.S.C. § 1498 by Act of Oct. 31, 1951, c. 654, § 50(c), 65 STAT. 727; see 2 U.S. CODE CONG. SERV. 1951, 2576, 2593.

[128] Act of June 6, 1911, RGBl. 1911 at 243, now § 15 of the German Patent Act of May 5, 1936, as re-promulgated on July 22, 1953, BGBl. 1953 at 627. For the judicial construction of this section consult Benkard, KURZKOMMENTAR ZUM PATENTGESETZ, GEBRAUCHSMUSTERGESETZ UND PATENTANWALTGESETZ 216 (1954); see also Riesenfeld, *The New United States Patent Act in the Light of Comparative Law I*, 102 U. PA. L. REV. 291, 321 (1954).

[129] Information obtained in the German Patent Office in Munich by the author. For the period between 1911 and 1920 no complete data are available because of the destruction of the files.

3. Compensatory and Appreciatory Awards

As mentioned before, the Act of 1954 retains the policy of establishing a system of administrative compensatory or appreciatory awards to be handled by a Patent Compensation Board designated by the Commission. The central statutory provision is section 157[130] and is implemented by Regulations, 10 C.F.R. Part 80, as amended on June 7, 1955. According to the present law the Board considers four types of applications:[131] (1) for just compensation for any patent revoked in whole or in part by virtue of section 151(a) and (b), rendering inventions useful in the utilization of special nuclear materials or atomic energy to that extent non-patentable; (2) for just compensation for government communication to foreign nations of restricted data based upon a patent application belonging to an owner other than the United States;[132] (3) for determination of a reasonable royalty fee for compulsory licenses imposed either under section 153 because of the primary importance of the invention and the need for such licensing, or under section 158 because of antitrust law violations; (4) for making any invention or discovery useful in the production or utilization of special nuclear material or atomic energy without being entitled to compensation or royalty therefor under the act. In addition the Board may also grant incentive awards for especially meritorious contributions to the development, use and control of atomic energy without formal application upon recommendation by the General Advisory Committee and with approval of the President[133]—the so-called "Fermi Prize."[134]

Since in the atomic energy field the determination of what constitutes a reasonable royalty fee for a compulsory license or just compensation for total or partial revocation of an issued patent is by no means obvious, especially in view of the large share of government support in the development and the rapid advance of the technology in this area, the statute spells out a number of factors and considerations to be taken into account.[135] It would seem, however, that the practical applicability of these standards for the two purposes indicated will be slight, since the better part of the life of the patents which might have been revoked by the 1946 legislation has now

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130 68 STAT. 947 (1954), 42 U.S.C. § 2187 (Supp. IV 1957).

131 10 C.F.R. § 80.10 (Supp. 1957).

132 Pursuant to 42 U.S.C.A. § 2223 (Supp. 1957).

133 68 STAT. 947 (1954), 42 U.S.C. § 2187(b)(3), 2d sentence (Supp. IV 1957).

134 AEC, SEVENTEENTH SEMIANNUAL REPORT 38 (1955).

135 68 STAT. 947 (1954), 42 U.S.C. § 2187(c)(1) and (2) (Supp. IV 1957). It would seem that the special reference to "any defense, general or special, that might be pleaded by a defendant in an action for infringement" is superfluous. A similar phrase contained in the former statute circumscribing government liability for unlicensed use of patents was deleted upon its transfer into the new Judicial Code of 1948, 62 STAT. 941 (1948), 28 U.S.C. § 1498 (1952); see Reviser's note to that section.

expired and the prospects for compulsory licenses, other than as the result of an intentional violation of the antitrust laws, are not impressive.

On the other hand, it is worth noting that the same factors also control the grants of awards which are provided for persons making any invention or discovery *useful* in the production or utilization of special nuclear material or atomic energy *"who are not entitled to compensation or a royalty therefor under the Act."*[136] While the latter authorization makes it possible to reward the otherwise unprotected inventors in the still un-patentable atomic weapons field, the scope of this power is by no means restricted to that area. Rather it permits pecuniary awards to meritorious inventors making contributions to any sector of the entire technology pertaining to the utilization of atomic energy, regardless of patentability, so long as they are not eligible for other types of pecuniary benefits under the act. The legislative history of the act seems to show that this system of merit awards was not designed merely as a substitute for patentability in regard to the excluded subject matter as under the 1946 Act,[137] but was intended as an additional stimulus for inventive activity in a broad sector of technology deemed to be of crucial importance.[138] In the light of such congressional policy it seems to be a practice of dubious wisdom, if not questionable validity, that the AEC adamantly insists on inserting waivers of all claims for pecuniary awards under the act in its patent contract clauses.[139] The individual contractor who himself has to forego full patent rights under the patent clauses—if not under section 152—will have little interest in, or might otherwise be incapable of, establishing incentive awards for his personnel. Congress appears to have spoken in the atomic energy field although the general subject of incentive awards for private inventors outside of, and in addition to, the patent system is still an issue awaiting final determination.[140]

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[136] 68 STAT. 947 (1954), 42 U.S.C. § 2187(b)(3), first sentence (Supp. IV 1957) (emphasis added).

[137] An award of this type was granted in Application of McClellan, 91 U.S.P.Q. 278 (1951), CCH ATOM. EN. REP. ¶ 3154, and reserved in Application of Schulz, 94 U.S.P.Q. 124, CCH ATOM. EN. REP. ¶ 3155 (1952).

[138] The same conclusions are reached by Boskey, *Some Patent Aspects of Atomic Power Development*, 21 LAW & CONTEMP. PROB. 113, 119 (1956).

[139] See the text quoted note 102 *supra*.

[140] Legislation aiming at the provision of awards for inventive contributions by persons other than government employees has been before the Congress since 1952 when Representative Celler introduced H.R. 7316, 82d Cong., 2d Sess., to that effect. The bill never went beyond the committee stage and its successor in the 83d Congress had no better fate. In the 84th Congress, 1st Sess., H.R. 2383 was introduced for the same purpose and, after extensive hearings and favorable report from the Judiciary Committee, passed the House on July 30, 1955. The Senate, however, took no action. In the 85th Congress Representative Celler resumed his efforts with the introduction of H.R. 103, 85th Cong., 1st Sess., which was again reported favorably by the Committee on the Judiciary, H.R. REP. No. 148, 85th Cong., 1st Sess. (1957) (with

4. Special Safeguards against Improper Acquisition and Use of Patents

Because of the shift from a system of secrecy and government monopoly to a regime of open competition and private enterprise, during the turbulent gestation of the legislation it was felt in some congressional quarters that some additional safeguards regarding acquisition and use of patents needed to be written into the act in order to forestall the possibility that someone might reap undue advantages from a technology so largely developed with public funds.

(a) Definition of prior art. Section 155[141] specifies that "in connection with applications for patents covered by this Chapter, the fact that the invention or discovery was known or used before shall be a bar to the patenting of such invention or discovery even though such prior knowledge or use was under secrecy within the atomic energy program of the United States." According to an express provision in the general patent law of the United States a person is not entitled to a patent if "the invention was known or used by others in this country . . . before the invention thereof by the applicant for patent."[142] But, although equivalent language has formed part of the controlling statutes at least since the patent act of 1836,[143] it cannot be said that the exact meaning of the phrase "known or used by others" had become completely clear and fixed. To be sure, in *Gayler v. Wilder,*[144] the early leading case in point, Chief Justice Taney, speaking for the majority of the court, had taken the position that the words in question were not to be taken in their literal or absolute sense,

legislative history at 7). It was placed on the Consent Calendar, but upon objection stricken therefrom on April 1, 1957. On June 27, 1957, Representative Nimtz re-introduced an identical bill as H.R. 8420, which was not acted upon before the adjournment on August 30, 1957. The proposed act is expressly intended "to stimulate private enterprise by encouraging private and Government exploitation of inventions and inventive contributions made by employees of Government contractors," H.R. REP. No. 148, 85th Cong., 1st Sess. 9 (1957), and to apply to inventive contributions "whether or not patented, unpatented or unpatentable."

[141] 68 STAT. 947 (1954), 42 U.S.C. § 2185 (Supp. IV 1957).

[142] 29 STAT. 692 (1897), 35 U.S.C. § 102a (1952).

[143] Section 6 of the patent act of 1836 predicated the right of an inventor to a patent on the condition that the subject matter claimed was "not known or used by others before his . . . discovery or invention thereof." 5 STAT. 119, c. 357 § 6 (1836). Already the first American patent statute of 1790 had tersely specified that the purported invention was "not before known or used." 1 STAT. 109, c. 7 § 1 (1790); but the second law of 1793 had given a somewhat more complex regulation. On the one hand that act required that the invention for which a patent was applied was "not known or used *before the application*"; on the other hand, it recognized that it was a valid defense against an action on a patent "that the thing, thus secured by patent, was not originally discovered by the patentee, but had been in use . . . anterior to the supposed discovery of the patentee. . . ." 1 STAT. 319, 322, c. 11, §§ 1 and 6 (1793) (emphasis added). For a construction and reconciliation of these clauses see especially Pennock v. Dialogue, 27 U.S. (2 Pet.) 1 (1829); Shaw v. Cooper, 32 U.S. (7 Pet.) 292 (1833); *cf.* Reed v. Cutter, 20 Fed. Cas. No. 11,645 (C.C.D. Mass. 1841).

[144] 51 U.S. (10 How.) 476 (1850).

but had to be construed in the light of the overall statutory policies and objectives. Accordingly he concluded "that by knowledge and use the legislature meant knowledge and use existing *in a manner accessible to the public.*"[145] But his views had prompted impassioned dissents by some members of the tribunal[146] and, moreover, were questioned, at least to some extent, in a subsequent leading case.[147] As a result, the problem of whether secret development and use of an invention may constitute anticipation barring a subsequent invention has remained in an unsettled and unsatisfactory state although modern text-writers have relied on the dictum of *Gayler v. Wilder* with apparent approval.[148] Accordingly, a specific clarification of the subject with respect to patents relating to the production and utilization of atomic energy could justly seem desirable, especially in view of the previous far-reaching secrecy of the atomic energy program in the United States.

Actually, the section in question has been bitterly attacked by such an eminent authority in the field as former Commissioner of Patents Casper Ooms as an unnecessary and unwarranted departure from established principles of American patent law.[149] But it would seem that the learned critic is not by far on as firm a ground as he asserts to be, and that a good deal can be said in defense of the policy of the act. Unfortunately, however, the draftsmanship of section 155 is not impeccable; especially the reference to "before" without clearly stating whether the time of the subsequent "invention" or merely of the application is intended might produce unnecessary confusion. Greater harmony with 35 United States Code, section 102(a) would be preferable. It also has been suggested that the bar of the act is too stringent and that prior knowledge or use in connection with the atomic energy program should be anticipatory only if described in a paper published by the Technical Information Service of the Commission;[150] but again it appears to be debatable whether such restriction is really beneficial.

(b) Monopolistic misuse of patents. Section 158 of the act[151] contains a special provision relating to the case in which the owner of any patent for an invention of primary use in the utilization or production of special nuclear material or atomic energy is found by a court of competent juris-

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[145] *Id.* at 496 (Emphasis added).

[146] *Id.* at 498 (Justice McLean), 501 (Justice Daniel).

[147] Coffin v. Ogden, 85 U.S. (18 Wall.) 120, 125 (1873).

[148] WALKER, PATENTS § 60 (Deller ed. 1937); but contrast CURTIS, PATENTS §§ 86, 87 (4th ed. 1873).

[149] Ooms, *Some Suggestions Relating to Patent Provisions in Atomic Energy Legislation to Protect the Public Interest*, 38 J. PAT. OFF. SOC'Y 38, 60 (1956).

[150] Cole, *Patenting Nuclear Developments*, 13 NUCLEONICS No. 4, 31, 34 (1955). Accordingly an amendment inserting a proviso to that effect in § 155 of the act has been proposed in H.R. 600, 85th Cong., 1st Sess. § 3 and H.R. 5694, 85th Cong., 1st Sess. § 14 (1957). See Zimmerman, *Patents—Proposed Legislation on Section 155 of the Atomic Energy Act of 1954*, 26 GEO. WASH. L. REV. 328 (1958).

[151] 68 STAT. 947 (1954), 42 U.S.C. § 2188 (Supp. IV 1957).

diction to have intentionally used such patent in a manner so as to violate the federal antitrust laws. In such contingency the court may require the guilty owner to grant licenses to any other licensee of the Commission who demonstrates a need therefor subject to the payment of a reasonable royalty fee. This section which owes its origin to a senatorial afterthought[152] and its purported improvement by the Conference Committee[153] actually fulfills no special purpose and is likely to stifle rather than to facilitate the efficient administration of the antitrust laws. Compulsory licensing as a sanction for the employment of patents in antitrust violations has been recognized by the Supreme Court in a long line of adjudications[154] and the limitations of the statute are only apt to embarrass the government in the pursuit of its consent decree practice and to foreclose the possibility of even more stringent sanctions.[155] Calling the section merely "unnecessary" as has been done by another commentator[156] is therefore actually a polite understatement.

II

NORMAL PATENT LAW AND NUCLEAR TECHNOLOGY

It has been urged on diverse occasions and from various quarters that full and untrammeled application of the "normal" patent law should be restored to the atomic energy field.[157] Intrinsically, nuclear technology possesses no different patent aspects than other branches of inventive endeavor. The sole problem peculiar to atomic science seems to concern the patentability of artificial elements and isotopes. The statutory catalogue of patentable subject matter recognizes only "manufacture" and "composition of matter" as the basis for a possible product patent[158] and it has been held that the isolation of a chemical element is not susceptible of

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[152] See text to note 75 *supra*.

[153] See text to note 78 *supra*.

[154] Besser Mfg. Co. v. United States, 343 U.S. 444, 449 (1952); United States v. Gypsum Co., 340 U.S. 76, 93 (1950); United States v. National Lead Co., 332 U.S. 319, 335–51 (1947); Hartford-Empire Co. v. United States, 323 U.S. 386, 415–18 (1945), *clarified*, 324 U.S. 570 (1945).

[155] *Cf.* United States v. General Elec. Co., 115 F. Supp. 835, 843 (D.N.J. 1953), and the discussions provoked by it: REPORT OF THE ATTORNEY GENERAL'S NATIONAL COMMITTEE TO STUDY THE ANTITRUST LAWS 255–59 (1955); Diggins, *The Patent-Antitrust Problem*, 53 MICH. L. REV. 1093, 1115 (1955); Note, *A Study of Compulsory Licensing and Dedication of Patents as Relief Measures in Antitrust Cases*, 24 GEO. WASH. L. REV. 223 (1955); Note, *District Court Dedication of Patents to Public Use*, 54 COLUM. L. REV. 278 (1954); Note, *Patent, Dedication as Antitrust Remedy: New Light on Hartford-Empire*, 63 YALE L.J. 717 (1954).

[156] Ooms, *Some Suggestions Relating to Patent Provisions in Atomic Energy Legislation to Protect the Public Interest*, 38 J. PAT. OFF. SOC'Y 38, 61 (1956).

[157] See, *e.g.*, WORKSHOPS ON LEGAL PROBLEMS OF ATOMIC ENERGY, U. OF MICH. LAW SCHOOL 88 (1956).

product claims[159] under either of these two concepts. But it could be argued convincingly that the thrust of this rule does not apply to new elements or element types which do not exist on earth and are entirely the result of man's ingenuity. As the subject was discussed not long ago with lucidity and completeness by Mr. Dunlavey,[160] reference to his exposition may suffice. Patent applications covering such matters are usually under secrecy orders. Consequently the attitude of the Patent Office is unknown to the author.

Actually the special treatment patent-wise of nuclear inventions is dictated by policy considerations predicated on four different though interrelated factors: (1) the current state of nuclear technology is, in the main, the result of the expenditure of huge amounts of public funds; (2) even in times to come vast sums of public funds, in addition to private resources, will have to be spent in order to assure the necessary pace of development; (3) control of atomic information, at least in some respects, is required by the demands of national security; (4) a central government agency is needed as an information clearing house in order to save wasteful duplications of efforts, concomitant with a completely private enterprise system.

Sober reflection cannot but lead to the conclusion that the effects of the first of these indicated four factors must cease to operate as time progresses and the results of privately financed research and development add to the advance of atomic technology. The remaining three reasons apply, perhaps with variations in degree, also to other fields of scientific and experimental inquiry. The political and social realities of our day have forced the federal government, acting through thirty-five or so departments or agencies, to assume financial responsibility for more than half of the total national outlay for research and development.[161] Since a large share of this activity is carried out by private industry or research institutions under contracts or grants, the attendant allocation of patent rights through appropriate clauses has become a matter of vital concern to the public. There seem to be no cogent reasons why the atomic energy field should be singled out for subjecting government contractors to a wholesale deprivation of patent rights regardless of the modality of their contributions such as that prescribed by section 152 of the act, or to particularly exacting patent clauses. It appears to be high time that the whole field of patent clauses for government contractors be carefully reviewed and made the subject of a uniform

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[158] 66 STAT. 101, 35 U.S.C. 101 (1952).

[159] General Elec. Co. v. De Forest Radio Co., 28 F.2d 641 (3d Cir. 1928).

[160] Note, *Can Artificially Created Isotopes of Chemical Elements Be Patented?*, 42 CALIF. L. REV. 676 (1954).

[161] *Cf.* Honey, *Federal Government Organization and Programs for Research and Development—an Overview*, 17 FED. BAR J. 216 (1957); Colman, *Small Business and Research and Development*, 17 FED. BAR J. 285, 286 (1957).

overall legislative or executive policy directive. Only thus can the American patent system be kept free from unwarranted corrosion.

Unquestionably some of the most felt[162] difficulties in, and limitations on, the exercise of normal patent rights stem from the secrecy regime governing atomic energy information. The owner of inventions in the nuclear field finds himself in front of a double-barreled gun, *viz.*, the secrecy provisions both of the general patent law and of the Atomic Energy Act.

Involuntary[163] secrecy of patent applications and consequent withholding of the grant of patents thereon was first introduced into the American patent law by a special statute of 1917[164] as a war-time measure. Shortly before the entry of the United States into World War II the power to issue secrecy orders was extended to peacetime for a period of two years[165] and supplemented by an amendatory act barring patent applications abroad except by special license and providing more effective sanctions.[166] After the outbreak of World War II, the regime was continued for the duration.[167] In 1952, the Invention Secrecy Act of 1951[168] recast the whole law pertaining to secrecy orders relating to inventions and placed it on a permanent basis. The codification of the patent law which took place during the same year transferred this regulation, with slight modifications, into the general patent law.[169] Under the current provisions, inventions in which the government has a property interest[170] as well as wholly privately-owned patent applications[171] may be placed under secrecy orders in the interest of the national security and the grant of the patent withheld,[172] such order barring the filing of foreign patent application except upon authorization by a license granted with the concurrence of the head of the departments or the chief officers of the agencies who requested the secrecy order.[173] Individuals damaged by the secrecy order are entitled to compensation.[174]

In addition, the Atomic Energy Act provides that all data concerning

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[162] See the revealing testimony of Dr. Starr, General Manager of the Atomics International Division of North American Aviation, Inc., in *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 85th Cong., 1st Sess. 203, 210–14 (1957).

[163] For the possibility given to the inventor by the Patent Act of 1836 § 8, of requesting his patent application to be kept in the secret archives of the Patent Office, see Woodbridge v. United States, 263 U.S. 50 (1923).

[164] 40 STAT. 394 (1917), 35 U.S.C.A. § 42 (1929).

[165] 54 STAT. 710 (1940), 35 U.S.C. § 42 (1940).

[166] 55 STAT. 657 (1941), 35 U.S.C. §§ 42a-42f (Supp. 1941–1946).

[167] 56 STAT. 370 (1942).

[168] 66 STAT. 3 (1952).

[169] 66 STAT. 792, 805, 815, 35 U.S.C. §§ 181–88 (1952).

[170] 66 STAT. 805, 35 U.S.C. § 181, para. 1 (1952).

[171] 66 STAT. 805–06, 35 U.S.C. § 181, paras. 2 and 3 (1952).

[172] 66 STAT. 805–06, 35 U.S.C. § 181, paras. 1 and 3 (1952).

[173] 66 STAT. 807, 35 U.S.C. § 184 (1952).

[174] 66 STAT. 806, 35 U.S.C. § 183 (1952).

(1) the design, manufacture or utilization of atomic weapons; (2) the production of special nuclear material; or (3) the use of special nuclear material in the production of energy is "restricted data"[175] and, as such, "born classified" and subject to the information control by the Atomic Energy Commission.[176]

The interrelation of the secrecy provisions of the patent law and the Atomic Energy Act is unfortunately quite confusing.[177] Where the AEC asserts the domestic title to the invention under section 152 of the Atomic Energy Act or the governing contract patent clauses and chooses to prosecute the American patent application itself no particular problems arise to that extent. The Commission files the application with Division 70 of the Patent Office—the division in charge of the security laws administration—and transmits simultaneously a request for a secrecy order.[178] But where the domestic title to the invention remains in a private individual the situation is not so simple. Apparently, the fact that the application contains restricted data does not *in itself* bar a filing of a patent application with the Security Laws Administration Division of the Patent Office,[179] provided that the regulations for external transmission of classified materials[180] are observed and that care is taken that the requisite request for a secrecy order is obtained.[181] Of course, in such case the grant of the patent will be withheld until declassification and rescission of the secrecy order, the applicant being entitled to compensation under title 35 United States Code section 183 unless waived.[182]

Additional difficulties arise with respect to foreign applications in the

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[175] 68 STAT. 922 (1954), as amended, 42 U.S.C. § 2014(r) (Supp. IV 1957).

[176] See especially Green, *Information Control and Atomic Power Development*, 21 LAW & CONTEMP. PROB. 91 (1956); Green, *The Atomic Energy Information Access Permit Program*, 25 GEO. WASH. L. REV. 548 (1957).

[177] For brief discussions of the situation see also Wiles, *The Atomic Energy Act of 1954*, AM. PAT. L. ASS'N. BULL. 343 (1957); Mackey, *Corporate Patent Practice in the Atomic Field*, AM. PAT. L. ASS'N. BULL. 348, 350 (1957).

[178] For the number of secrecy orders on Commission-filed patent applications see communication by the AEC to the Joint Committee on Atomic Energy, *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 85th Cong., 1st Sess. 305 (1957).

[179] It seems safe to assume that the officials of Division 70 are persons "authorized to receive Restricted Data" within the meaning of 68 STAT. 959 (1954), 42 U.S.C. § 2277 (Supp. IV 1957); see also U.S. ATOMIC ENERGY COMMISSION, AEC MANUAL, § 9113–0112 (1955).

[180] 10 C.F.R. §§ 95.32 and 95.33 (1957).

[181] For the number of outstanding secrecy orders on atomic patent applications filed by private industry see the communication by the AEC to the Joint Committee, *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 85th Cong., 1st Sess. 305 (1957).

[182] Unfortunately and, in the opinion of the writer, *unjustifiably* the AEC insists upon waiver of the rights under 66 STAT. 806, 35 U.S.C. § 183 (1952), with respect to any invention or discovery made or conceived in the course of, in connection with, or under the terms of an access permit, 10 C.F.R. § 25.24(c)(2) (1957).

classified area.[183] Except where a bilateral international agreement provides for filing on a classified basis, the domestic inventor is barred from seeking a foreign patent until the information has been formally declassified unless he can eliminate the restricted data from his disclosure. Furthermore the mechanics of declassification imperil his foreign patent status and the cooperation of the AEC is needed to prevent publication which destroys patentability abroad.[184] To be sure, the AEC has endeavored to assist domestic inventors in preserving their foreign rights,[185] but a special provision permitting foreign filing with the license from the AEC just ahead of formal declassification might obviate some of the unnecessary dangers.

CONCLUSIONS

The foregoing discussion had the purpose of showing that the patent regime in the atomic energy field suffers from three cardinal defects and requires legislative attention. (1) The special patent provisions of the Atomic Energy Act are to a large extent incongruous, superfluous and productive of unnecessary doubts and complications. (2) The secrecy regime of the act is too stringent and too rigid and requires adaptation to the patent protection of American industry abroad. (3) The patent policies of the Commission as practised in the contract clauses and dictated waivers of statutory rights appear to be too exacting and ought to be harmonized with those of other government departments responsible for research and development.

[183] See the discussion of the situation in the testimony by Dr. Starr, *Development, Growth and State of the Atomic Energy Industry, Hearings Before the Joint Committee on Atomic Energy*, 85th Cong., 1st Sess. 203, 210 (1957); and the communication by the AEC, *id.* at 300.

[184] See the testimony by Dr. Starr, note 183 *supra*.

[185] See the communication by the AEC, *id.* at 300.

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(Mr. Ooms defines the scope of his article as follows:

("This paper attempts to make a brief analysis of the special problem of patents in atomic energy legislation. It will attempt first to examine what a patent is, and what its effects are in a free enterprise industry such as that in the United States of America. Next, the special aspects of atomic energy technology which dictates consideration of any special patent treatment will be reviewed. And finally, suggestions will be made for incorporating applicable principles into the atomic energy legislation to provide for any unique aspects which atomic energy legislation requires.")

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